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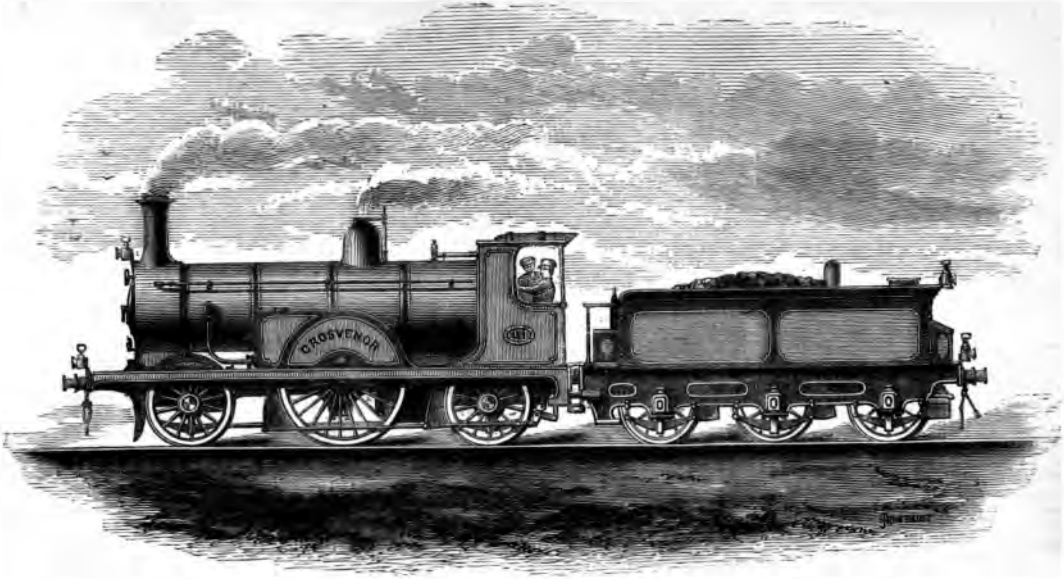
ENGINE DRIVING LIFE

Michael Reynolds.

HE ENGINE DRIVER'S FRIEND



" *The steam is up; the engine bright as gold;*
The 'Fire King' echoes back the guard's shrill cry,
The roaring vapour shrieks out fierce and bold,
A moment—and like lightning on we fly."

ENGINE-DRIVING LIFE

OR

Stirring Adventures and Incidents

IN THE

LIVES OF LOCOMOTIVE ENGINE-DRIVERS

By MICHAEL REYNOLDS

MEMBER OF THE SOCIETY OF ENGINEERS; AUTHOR OF "LOCOMOTIVE ENGINE DRIVING;" "THE MODEL LOCOMOTIVE ENGINEER, FIREMAN, AND ENGINE-BOY;" AND "STATIONARY ENGINE DRIVING"

Capio Lumen

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LONDON:
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TO

WILLIAM STROUDLEY, Esq., C.E.,

LOCOMOTIVE SUPERINTENDENT,
LONDON, BRIGHTON, AND SOUTH-COAST RAILWAY,

THIS WORK

ON

ENGINE-DRIVING LIFE

Is Dedicated

AS A TRIBUTE OF RESPECT AND ESTEEM

BY

THE AUTHOR.

PREFACE.

I HAVE endeavoured in these pages to perform a labour of love, giving the public an insight into the life of our locomotive drivers. Feeble and faint is the story at best. It is impossible to transfer to a printed page anything but a dull picture; suggestive of the original, it is true, but I fear that is all. It is now some years since I first became acquainted with railway tradition. Much has been lost to memory, but that which remain's has been well considered and carefully reduced to order.

Nought is heedlessly set down or is void of purpose, for I have written from the facts, and have, consequently, shown up men and incidents as they are. In a word, I have given the reflection of my own experience, extending over a period of twenty years. Many will see *their* own experience; while the public at large, who know but little of our railway men, although there is much in their lives of an interesting character, will see something fresh. They are beings who possess a hearty belief in the reality of earnest endeavour; of manly and godly affections. They are men who exhibit heroism as genuine as that which graces a battle-field: men who die at the post of duty, in all the pride of manhood, turned by erring hands into the valley of the shadow of death.

These pages will recall some vanished lives to surviving friends, and although the immortelles may wear off their dishevelled circlets, and the geraniums may no longer blossom amid marble tombs and green knolls, here there is a permanent memorial for the lonely widow's son, for the dear brother, for the loving husband, for the betrothed.

MICHAEL REYNOLDS.

STANDEFORD,
WOLVERHAMPTON.
November, 1880.

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ENGINE-DRIVING LIFE.

CHAPTER I.

INTRODUCTION.

THERE are many facts in our railway life that pass unnoticed and unrecorded, and are lost in oblivion; for few there are who witness the struggle for advancement, who search for the platines of fine gold and bring them to the surface.

The battle of life absorbs all our energies, and it is because we are not all cast in the same mould that now and again we hear of adventures which throw fresh light on the history of men, their character and deeds, and the record of which enables others to trace the reflection of their own experience.

Who can contemplate without emotion the demise of a man that had lived and acted for years on the foot-plate of a locomotive engine, leaving behind him not a vestige of his experience? Who could have informed us of the discipline by which he was trained to handle the lever with confidence, and to run year after year surrounded by hundreds of dangers, and yet dying a natural death? Who can doubt that such an one goes on his long last trip carrying with him railway experience the record of which could have filled volumes, setting forth the lights and shadows of a mind under the dominion of circumstances, and the knowledge and experience acquired at all risks, by pluck, endurance, and courage? Can any one for a single moment believe that a volume of even five hundred pages can tell us the half of all that passed through George Stephenson's mind? No; volume on volume has gone with him. The world knows nothing of half the wisdom there is in it. The world is an intruding power, and scatter if you will at her feet, as flowers, all your best ideas, she will turn and curse you. So wise men glean and keep and feast in secret. The wisdom that may be taught by the writings or the experience of others is of inestimable value; but it is, after all, only a portion of the whole, simply the crumbs from the world's table.

Did any one ever hail a fellow in the same craft or line of life as himself without finding he had done battle with a different set of circumstances from those of his own life? Never.

Some men's minds are as solid as marble, hardened by old habits and thoughts against believing anything but what is within their own experience; and they, having paid for their experience with loss of gold or loss of limb, leave others to follow as they may in their footsteps. Such a habit of mind is particularly characteristic of our brave army of engine-men. Many an engine-man has read the fine-list and been able to run up a score of instances in which similar accidents have happened, and yet he himself will go and do the same thing. How is that? Because many men have formed opinions of their own respecting the abilities and enginemanship of other drivers; and when misfortune overtook a man, they were so inflated with conceit in finding their opinion verified by a fact that, instead of investigating the cause of the misfortune, they jumped to the conclusion that the cause was in the man, and not in the circumstances of the case. Therefore, when the like causes were present with them in like conditions, they dropped into the same trap.

Reticence on the part of engine-men has always prevailed; and it is easily accounted for in the fact that few have at any time been of the same opinion on any locomotive question: even the acutest have at times been wrong. I remember a good [illegible]e-man complaining about his engine not being able to run at high speed, saying that she was wrapped up, meaning that she had too much lap on the valve, whereas there was nothing of the kind; the cause of her failing to attain a high speed was that the steam-ports were too small to admit the steam in and out of the cylinder with sufficient freedom to admit of a quick speed of piston.

The practice of locomotive driving is a field teeming with facts and incidents, cause and effect leading up by natural and consistent steps towards perfection through long winter nights in wind and in rain, in lightning and thunder; at all times surrounded by hidden dangers, and ending at times in a dreadful, sudden death. A man may have the best of locomotive knowledge, and still, if he is unaware how and where others have met with accidents, he will be assaulted by surprises, and his progress will be but slow.

Distinctly predominant among the causes of surprise is the uncertain nature of the materials by means of which he earns his bread. Uncertain is the material over which his engine glides, and fallible are the men amongst whom he works and on whom his life as a driver depends, as the swift wheel turns round and round. Everything about him is in action, at war one with another—wear and tear, time and decay.

How much real public service is done by cautioning men where others have failed, we never can know. We, however, must snatch a few lessons of experience from oblivion.

CHAPTER II.

ENGINE-BOY—EARLY STRUGGLES.

THE locomotive engine is the most beautiful mechanical construction of this or any other time. We watch it under steam from a distance, from meadows where in the sun the cattle graze, and it seems to fly as the swallows fly—skimming above the horizon, and presently we see its colossal form crossing the mighty arches which span the valley of the river. Then we on the platform shrink from it aghast as it rushes past in the full thunder of its power, and, straining on its course like some mighty monster broken loose, it is an object of intense and almost passionate interest. Hence it is that there are never wanting among us volunteers for the wild-like life of the rail. The boy intended by fond parents for quite a different career, dreams of the speed and the adventures of the road, and in his wakeful hours he strolls as far as the crossing-gate to talk with the railway men. To and fro, between the house and the school, others may stop and jump the brook at the mill or go bird-nesting, but for him there is nothing in the world so captivating and alluring as the iron monarch bringing the train round the curve in the distance. Nearer and nearer it approaches him, and he climbs on to the bridge, and astride the parapet he gallantly receives a sonorous puff from his monster love.

The passion grows with his growth, strengthens with his strength. He leaves all thoughts of sea behind; he will *neither be a sailor*, nor a miller, nor a butcher. He has resolved to be a locomotive driver, and at last he finds his way, either by permission or by ruse, to the engine-shed doors, looking wonderingly at the big engines as they come in off the track, with their steely limbs covered with the dust of many a county. There he sees the steeds that make his eyes glisten again; engines that have struggled in the embraces of a gale; that have, on the iron highway, in thunder and in lightning, defied the elements and ridden through the storm safely home. Others there are, now over the pits, gentle as lambs, with limbs of burnished iron and cleading smoothly finished; these will soon be hitched on to their cars, and in the darkness of the night will be rushing on in direct line, swiftly and heedlessly ahead, with the glare of the head-lamp reflecting on either side towards their destination.

The lad's heart feels that that shed is blissful Eden—the garden of Paradise. It is his *first* heaven.

The driver of an engine has dropped a handful of waste; he runs to pick it up, and hand it to the driver. He has for the first time spoken to one of *his* gods.

The bell rings for the workmen to go to dinner, leaving the running-men behind, with the running-shed superior. Watching his opportunity, he timorously approaches him, and touching his hat he asks the "mighty god" if he wants a boy to help to clean engines.

The lad has the locomotive measles, and the "god" sees it in the little fellow's eyes—for he has it badly, and so, to bring him into form again, he is told to come again the next day at six o'clock.

What a victory! Blithe as a bird's is his song. He falls to sleep in a dream of rail-life. He is up with the lark in the morning, and the young beginner finds himself in a team of youngsters like himself.

A lad will avoid crime, as crime is understood in a shed—that is, filling axle-boxes with sand, and going into a warm fire-box to skulk instead of doing his work. He will avoid such things for fear of being found out. The test, therefore, of a boy's character is the degree of attention he pays to the minutiæ of conduct. Service rendered not grudgingly or of necessity, but with cheerfulness.

There are many temptations in a running-shed to indulge in coarse language, to be clever at ruses, and sharp at excuses; to be the liar, the coward, and the slave. These are big failings, and some natures can easily resist them. But there are little failings—such as temper, discontent, and vanity—that require watching. They gradually eat away all that is good in a lad.

If a lad is brave, frank, kind, true; brave to keep good time; frank to his foreman; kind to his juniors; true to his work; the measured tread of his onward progress will make itself visible. From the team of young recruit cleaners he will be selected to get an engine to himself, so that his work will afterwards speak for itself.

Patient endurance on the one hand, and unceasing labour and noble effort on the other, gallantly carried out through two winters and two summers, generally reward a cleaner with a berth on a shunting-engine. But many of them, long before they have reached this position, have rubbed all ambition out of their souls. The sinews and backbone have been drawn, and they have gradually become creatures of circumstances. Others keep on clearing the way, sowing seed and welcoming every ray of fresh light until harvest-time comes. And it comes to all who wait. That is a brief pictorial saying, compact and full of meaning, suggesting much that it would occupy too much space to tell; constructed, however, for ordinary memory, and likely to fall into susceptible hearts; we therefore gladly re-echo it—Sow the seed; sow in the morn; sow in the eve; and the harvest-time will come. Let us guard against putting the condition of reaping in the place of that of sowing. It was *a* sower on the fertile shores of the Lake of Galilee, a solitary husbandman, busy scattering the wheat-seed in the furrow, who was immortalised. This is the age of associations; individual effort is in a large manner superseded by corporate action, and we are apt to think of a *band* of sowers. Now whether we will have it so or not, sowing is lonely work; *the sower toils all* day alone, marching on, still marching on, from furrow to furrow. He may sow in tears, but who can see them, who heeds them? There is no foliage on the trees, no verdure on the meadows. The sky overhead, when not covered with dark clouds, is of a cold, stony blue; the sunshine has a brassy gleam, and shines mockingly upon bare pastures, whilst folk breathe between their hands to keep them warm. Who heeds your tears? None. Sow the seed, if it is all you have. Sow the seed, if it does lie a long time out of sight. Sow the seed at morn and at eventide, and faint not, and the time will come when, before a gay group, amid sympathetic and jubilant gladness, you shall put the scythe into the fruit of your toiling.

Before the lads reach the stage at which they are fitted for a fireman's berth, they are often assailed by the hardships and misfortunes which lie in wait for railway servants.

A few instances will illustrate the point, and they will show that there is scarcely another calling in life in which hope and death are so blended together.

Littleton Carless was a bar-boy—that is, one who has to creep through the fire-hole door of the engines with a torch-lamp and a scraper, to arrange the fire-bars in their proper places on the bearers, and to clear the fire-box and the brick arch of clinkers and ashes. On the performance of this work very much depends. If it is done slovenly, it tells its tale when the engine is attached to the train; the dirt when left on the bars prevents the air from the ash-pan entering the fire, and two evils are at once brought into operation which make against the engine steaming properly. When the cold air cannot enter the fire through the bars, the fire loses the necessary amount of oxygen to insure perfect combustion, and the fire-bars lose the necessary current of air to keep them from melting. Littleton's work was, then, done inside of locomotive fire-boxes. He, for the glory of being amongst engines, walked night and morn, and morn and eve, every alternate week, three miles and a half, to Bushbury, from Slade Heath; and he faced the hard winter nights, with their bleak winds blowing around him, in preference to lying between Witney blankets, whilst many a boy was at home with his brothers and sisters by a cheerful fire. But he was impelled onwards by the thought that by-and-by he should get an engine to clean instead of bars to lay.

He left home one bitterly cold winter's night, and his father, mother, and sisters—Nelly and Jinny—remarked before they went to bed what a dreadful night it was. "We are all at home," said one, "but our poor little Littleton; he will have a rough time of it." In the dead of the night, soon after he had taken his supper, an engine-man called him to open the shed-doors, which were closed to keep the cleaners warm, and to keep their torch-lamps alight. Littleton had fastened one door back with the catch, and the other he had in the proper position for fastening. The driver, seeing the doors wide open, concluded they were all right, and he put on steam to enter the shed with the engine, tender first. Just as the tender was entering, a gust of wind forced the poor lad and the door, which he could not fasten, against the tender, when he was crushed between the edge of the door and the tender. Although he was mortally wounded, he could speak. He lifted up the arm that was crushed with the other and exclaimed, "My arm is broken, and my poor father is at home ill in bed!"

He was crushed in the shoulder, and taken to the hospital. It was the intention of the surgeons to amputate his arm if he rallied; but he did not rally, and died at the age of fifteen. His sister Zilpah saw him and was frantic with grief, which was intensified by the fact that her brother left home so well. On his funeral card were the appropriate words:—

"In perfect health I left my home,
Not thinking that my time was come.
In a short time my race was run—
Weep not, dear friends, God's will be done."

This sad accident was caused by the driver assuming that the shed-doors were fastened back. Instead of sending his fireman to do the work, he thought it of no consequence to call upon a boy to do fireman's work, or rather to do his own work. Scores of shed-doors have been run into through drivers not themselves seeing, before moving their engines, that the doors were properly and efficiently fastened back.

There is a little question that should be asked more often than it is about a shed. That little question is, "Are you right?" Suppose the driver, before he moved the engine, had asked the question of Littleton Carless, and had not moved until he had obtained a reply, the boy's life would have been saved. Let running-shed men remember that little question before they move an engine; and, of all men in the world, running-shed men, and all other railway men, *should not assume anything*. What is needed to prevent accidents is more of concentrated action.

Bar-laying has to be done very often in fire-boxes having a temperature of 250°. The bars are not only replaced and cleaned, but the tube-plate is to be cleaned down with a steel broom; and by the time the work is done in this "hot shop," the perspiration rolls off the bar-boy's skin; and, coming out into the cold air, he very often takes cold, which is very trying to the constitution.

A lad is ready enough to bid farewell to fire-box work when he has grown too large to pass through the doorway, and take to cleaning. For this purpose, he is supplied with waste, oil, and tallow; and he comes on duty when the engine is due, whatever time that may be, either in the day or in the night. A sharp cleaner first rough-wipes the motion,—that is, the machinery,—which is mostly covered with oil; and with the oily waste, after he has done everything else, he cleans the wheels. It is just as easy to clean an engine the wrong way as it is to groom a horse the wrong way. For instance, some cleaners will delay the hot work, whilst the oil and grease can be easily rubbed off, to do the cold work, such as wheels and framing; and when these are done with, they will go to work upon that which has *gone* cold. This irregularity happens only where the "gaffer" over the cleaners is not a professional hand at cleaning an engine, which is often the case. To clean an engine properly, the motion should be wiped and the bottom of the boiler well cleaned, high up between the splasher and the cleading; then the fire-box, both back and front, before the cold work is thought of. After the motion, the boiler should be dry-wiped, and the primary spots removed with tallow and water, and the chimney, smoke-box, and door cleaned with a wet greasy rag or waste;—they should not be wiped perfectly dry. Yellow grease is a fine material for putting a good polish on hot iron-work. When all the hot work is done, the framing can be proceeded with—dry-wiped first, then finished with a patch of hot water and a little tallow. Following this come the wheels, for which the oily waste is useful to remove the dust and dirt. The bright work should next be burnished with bath-brick and water, then rubbed with a dry cloth and some *elbow* grease, till it reflects like a mirror. Then the boiler should be done with a hot-water patch and a little tallow, and finished like the brass-work with a dry cloth, to give the paint a polished face. The chimney-end can then be wiped until perfectly dry, then the framing all round, and lastly all the axles. It takes ten hours at least to clean an engine. It requires no small amount of courage, perseverance, and endurance to clean an engine regularly all the year round, especially when icicles hang by the tender feed-pipe, and the wind whistles shrilly under the shed-door. That is the time to take the locomotive measles away. The discomfort of wiping off mud and slush for two years in all seasons of the year, requires a good deal of courage, for there are no indulgences; the engine has to be followed, cleaned in the day, cleaned in the night, cleaned in winter, cleaned in the summer, cleaned when the world is asleep, taking rest to follow in its train when the sun is overhead, cleaned and made beautiful and bright to be hitched into a train of still more beautiful cars.

But, nevertheless, upon all railways there is plenty of genuine solid old Teutonic pluck; plenty of lads as fearless of toil and struggle as ever broke bread; who, in thousands of instances, have left their homes and all its charms, night after night, in the hope and expectation of reaching some day to the regulator of a locomotive engine.

For they have pulled through hard winters, though haply they have been cut off all too soon by the hand of fate. Such was the lot of John King, a cleaner, who was a remarkably fine youth, amiable in disposition, correct in conduct, and of promising talent. He was religiously inclined from the period of infancy; and, at the age of twelve, he joined a Wesleyan class. His leader stated that during the remaining years of his life he never absented himself from his class meetings. His parents, though in humble circumstances, had managed to give him a moderately good education, and this in connection with his superior natural talent secured for him the favourable notice of a running-shed foreman who, like the late Mr. Joseph Armstrong, was a good man.

When King left school he went into the Locomotive Stores at the shed, and soon learned how to make out the drivers' coal-tickets, and book the stores to them. He had many opportunities of learning the routine of locomotive working. His way seemed to have fairly opened upon a goodly future. But he had not been in the stores long before he thought that the life of a driver was to be preferred to office work. After some doubts and fears about the matter, he chose to go a-cleaning engines; and he gave his fireman and driver every satisfaction, his engine being remarkably well cleaned. The engines as they come off the road are coaled and watered, and then put away in the sheds under the chimneys. In some sheds there is a chimney for each engine, and when some engines not so long as others are brought into position there is an open space left between two engines; that is, they are not close up together, buffer to buffer.

One morning, King was cleaning the buffers of his engine when other engines were being run into the shed, and the man who was putting engines away gave the engine next to King's a sharp bump, and the poor lad was caught between the buffers of the two engines and crushed in the chest. An alarm was raised, and as soon as possible he was released from his painful position and was carried away by his little mates. He said, "I am dying; all is right. Tell mother not to cry, for I am going to heaven." Thus suddenly ended the hopes of a bright cleaner-boy. There is no place in a steam-shed so near to death's door as the space between the buffers of engines. Scores of youths have found there the jaws of the grave; and if a list of the deaths of cleaners could be made out, with their causes, we should find that more are killed between buffers than by any other means. Let every engine-boy think of that. There are not all models such as Carless and King were, but on the other hand there are now and again some hot members in the cleaners' gang.

The warmest that ever came under the writer's notice was one Sellers, a cockney, a lad full of spirits which found vent either at one thing or another that was nought. This lad managed to get an engine to clean, which was only in the shed every alternate night—for the engine ran a trip of 160 miles with one stop of three minutes half-way, and returned the next day. He would therefore join the gang the night his engine was out, or skulk about; or he would book on duty with the others, and then slope off under the carriages in the siding, and down the embankment, across the fields into the town; and my lord would get another cleaner to deposit his ticket if he were not back by one o'clock. How this fraud was discovered is about as curious a story as can well be told. He was found out by a kind of magical divination, or, in plain language, by keeping the eyes open, and the mouth shut, and putting together all the scraps one hears. The writer was one evening in the town, following a band of very good musicians, when his attention was drawn to a company of "negro minstrels." There was one voice that attracted his particular notice, and that was all, and nothing more. But whilst the hat was going round, this individual, with great blackbeetle-crushers, red, white, and blue trousers, swallow-tail coat, and the professional hat, amused the audience with a number of jokes more or less referring to locomotive engines and railway-guards, and some were good, others doubtful, some unmentionable. They, however, tickled the ears of the people, and the nigger was loudly applauded; and this was followed by his singing a solo, accompanying himself with the bones, whilst another played a banjo. He had much cleverness in him, which showed itself when it was not wanted, and never showed itself when it was wanted. He also came round with the hat, and I threw him a copper; he passed on to a female who was near, and touching her under the chin said, "Shouldn't I like to take your photograph." Early the next morning I was down at the sheds just before the six-o'clock bell rang, and, when passing the cleaners' room, I heard the very same voice singing the same song. The following night his engine was in the shed, but meanwhile I found out who was singing, and I found he *was* supposed to have been at work when I heard him singing in the town. The next night I went into the town again, and heard the same nigger-cleaner singing the same old song, and I then returned to the sheds. He had been through the time-office and left his ticket, then joined the gang of cleaners, and having "shown up" to his satisfaction, and satisfied others that he was on duty, he took to his heels and his bones. I waited for him until one o'clock, when he turned up. I asked him to step into the office, and inquired if he could sing a song there, as he could sing so well in the town. He denied being a nigger occasionally, but, when I unbuttoned his slop, it revealed a swallow-tail coat, and underneath his over-alls there were the professional red, white, and blue trousers. He was discharged. Two years afterwards he turned up again in another district, for running an engine down the line, to call some drivers up, and for running the engine into the tail end of a goods-train. The engine was thrown on its side, and he, with some more cleaners, was pitched down an embankment.

CHAPTER III.

THE ENGINE-FIREMAN—FORMATION OF CHARACTER.

"A ROLLING stone gathers no moss." So says the proverb, and it is true. Activity is not sufficient to insure success unless it be directed to one invariable end. The path that leads to success must be pursued through all its asperities and obliquities—that is, if we wish to reach the object in view. The traveller who turns aside to gather every flower, or who hurries and sometimes loiters, will soon find that he is being left behind in the race to reach the goal. If we deviate from the track, our competitors go by, and it is then no easy matter to recover the lost ground. Onwards and upwards in earnest is the only way to attain a higher level.

There are aspirants for the foot-plate in whose natures there is something that revolts against the practical; who soar for a time with an imposing aspect, looking high and reaching out far, but they fail to sustain themselves on the wing, and they imperceptibly drop out of sight amongst the crowd. They started with views unique in presumption and utterly irreconcilable with common sense, and after they have been in the steam-shed a few months and become just nicely acquainted with oil, waste, fire-carrying, and night-work, they suddenly wake up and find the prize of their ambition lies further afield than they expected, through years of patient toil, and they begin to think there is no more chance of reaching the object they set out for than the man in the moon. For a time they run well, but lacking the force of perseverance they become utterly bewildered by the ascending ground they have to encounter.

Climbers climbing up the Breithorn to view the sunlight creeping up over the mountains, to reach the top and stand on the summit, require endurance stamped both in the heart and the limb. The object of the ascent is pretty plainly visible to the adventurers, but not so the summit, shrouded in its utter whiteness, standing in an awful calm; and to attain it, to see and behold a scene of wonderful beauty, one must struggle over slippery glaciers, very much crevassed, and must beware of the avalanche.

To gain the top and to see things inexpressible, one must do so through sore fighting by the aid of the alpenstock, with heat, perspiration, and smothered groans; and it will be in the midst of frozen solitudes that they will even then pass at a bound from a groan to a triumph. Even so. The mighty effective effort, no matter what direction it takes, extorts its pound of flesh; one ear hanging by a shred, the other a blister, and the neck from ear to ear a chain of blisters; all this must be a foregone conclusion where the work of achievement is of no ordinary kind. Something like a clue to the genius of events, accepted by common consent by those who have attained their object, is to acknowledge the power of little things. It is plain that there are no heights in nature or in society to be gained and retained unless one labours at it in thoroughness, any more than there are Alpine climbers, living or dead, who have reached the Matterhorn without mighty effort, wearied legs, giddiness, and occasional rests for breath-taking and refreshments.

Every one who enters a running-shed will find he has *his* world of difficulties there as well as all others have, in whatsoever sphere they may be placed; but as most of the native mountains have pathways, so apparently insurmountable difficulties have pathways, which become visible and passable as they are approached, marked by the footprints of companions in toil.

The steps of a locomotive engine leading on to the foot-plate land the engine-cleaner on the first landing in his aspiring labour, from which he can look back upon the way he has come, and reflect upon the clamour, the struggle, the unrest which make up the world about him.

To reach the foot-plate as a passed fireman is an accomplishment that thousands have tried at and failed—failed through indolence, through fatigue to pursue, failed through loss of hope and interest, failed because the flower appeared above the beds ready to be grasped. To those who have so far surmounted the difficulties we would say, Let the success which has attended you in the ascent stimulate you to energetic aspirations, and rest not until the topmost round of that Jacob's ladder of progress is reached.

Upon the foot-plate there are, at first, many things to attract a fireman's attention and thoughts. With change of scene, in the presence of objects brighter and more congenial than torchlight, cans of cleaning oil, bath-brick, and waste, the pulse is quickened; he regains his health and spirits as the links which bind him to those objects are broken one by one, and as his sympathies are drawn to the things immediately about him.

A fireman was once found almost beside himself sweeping up and wiping down the foot-plate. "What is the matter, my fellow?" asked the foreman. "I am happy now, sir," answered the man. When that is so, no matter in what sphere it is, there is a clear sky overhead, and the sun shines on the life which sails on a springtide of hope and gratitude, in proud consciousness of having achieved a triumph. With an overflow of spirits, which in its prodigal excess counts no toil and fears no exhaustion, a fireman begins his career with very little knowledge of the locomotive, excepting the names of its various parts. He has the key to the locomotive which is to unlock all its boxed-up treasures, but all his stock of information bundled together would not detect a screw loose in the lock, or give the clue to such symptoms as bring engines to grief. He is, therefore, in a state of unstableness, and his social qualities will in a great measure have much to do with his requiring a knowledge of good things—veritable facts. A sudden fit of obstinacy, a hasty word, a cold nature, visionary views of his own, a little knowledge, may act with a negative influence upon the driver with whom he is placed, and, therefore, instead of receiving counsel, he often finds he is his own counsellor. Friendship on any terms is declined by the driver. He allows the fireman to find out how to fire, when to fire, and where to fire; he allows him to choke the fire in his own presence. He allows the fireman to do as he likes, and to leave the coals in the tender to wander about the foot-plate, and the fireirons to lie about in all directions. He allows the steam to go down. His aversion has shown and proved itself when the fireman has been removed to the company of another driver, who has found he could do nothing effectively and smart. The driver is in charge of the engine, and it is his place to give the fireman a completer knowledge of his duties, and if he has faults he should see that every day mends one. It is a lesson to show him how to handle the shovel, how to shoot the coals off it as clean as shot into the fire-box, into the very place intended for them to lie. It is a lesson to show him how to prepare the engine, so that he can pack both glands, after he has been taught that the packing is a trimming as much as any other about the engine. It is a lesson to teach him how to take the bulk of the momentum out of the train with the brake, and then to slower the train under control to the platform. It is a lesson to teach him that many others have choked fires and stopped trains by making the fire too deep for the load. It is a lesson to tell him that it is possible to be a fireman without being as black as a tinker. It is a lesson to teach him that on an engine there should be a place for everything, and everything in its place. Where common sense prevails on the foot-plate, and the driver is well ballasted and moves on an even keel, and is not carried away by the winds of passion or warped by prejudice, and is not quick to heed the sanguine temperament of a young fireman, all is well. We must all learn, he knows. On the other hand, a fireman who gets on is circumspect; that is, as the etymology of the word indicates, he looks all round before venturing to act independently of the driver.

The reticence shown by some drivers on certain points has exhibited itself in a marked degree respecting the fireman's duties on the fire-list. The fireman, being a stranger to the driver, has been allowed to do certain things without the driver watching him, simply because he was an old fireman; and when a crisis arrived many a man has exclaimed, "I never dreamt of such a thing; why he is an old fireman." Again, it is not by any means new that a fireman goes up to pass for a driver, who knows nothing about the manner of testing valves and pistons, or how to distinguish a valve leaking from a piston-ring blowing through; who does not know that there are right-hand and left-hand engines, or why the slide-block rubs against the top slide-bar when the engine is running chimney first, and on the bottom bar going tender first; or the action of the blast, or the action of an injector, and many other things, notwithstanding such men have been with the best-conducted drivers on the road. Some young drivers, when they have booked the wrong piston, and it has been talked of in the shed or in the tap-room amongst drivers, have been known to ask themselves, "Did he not fire for Jim Holdfast for years on the express, and surely he must have known different?" But they themselves—one of them, at least—did not know that some engines, with the lever full over, are tested the right piston first, and others the left piston first. Why this should happen very few could explain. That it should not be left to the driver to teach the fireman all he requires to know is obvious; neither is it so now, as formerly. On most of the railways the inspectors take them in hand before they present themselves before the superintendent.

Firemen are, at the outset, appointed with drivers in charge of shunting-engines; that is, a class of engines designed generally without tenders, as they carry the supply of coal and water upon the engine-frame. Such engines are generally termed tank-engines. By means of them, the goods waggons, as they leave the loading shed, are arranged and formed into trains. That is, they put, say in Camden yard, all the waggons for Liverpool on one road; all those for Manchester on another; and the Scotch goods on a third road, and so on, ready for the engine to take them to their destination right through. Such trains are called express goods.

On the shunting-engine the young fireman learns to handle the brake, so as to bring the engine up to the waggons without loss of time, and without damaging them. He learns also, in a limited way, how to handle the shovel; how to put an injector "on" and "off;" and he acquires a bit of knowledge respecting coupling up. As he cannot move about the yard without signals, he finds that *green* signifies caution, or come up steady; *red* to indicate danger, and stop; and *white*, "all right." He has to hold points occasionally, and at the first pair he takes hold of, he trembles from head to foot for fear the engine should take a dislike to him and jump off the road. He then runs after the engine, and at first follows and jumps upon the hinder buffer-plank, so that if he does not succeed, and falls down, the engine runs away from him, instead of running over him. He grows bolder, and thinks no more of turning an engine through a double set of points, and following it up by jumping on to the step whilst the engine is moving, than of eating his supper. He makes friends, and chats with the chaps in the shunters' cabin, and enjoys it mightily, for he is in the midst of railway talk, surrounded by men with artificial limbs, and who have a strange history of their own. He hears them talking about "Jenny Linds" and "Bloomers;" and he finds these are the names of classes of engines which recall the scenes of their past lives. Joe Cheesman, with a caoutchouc jaw, relates how, when he was shunting for an express, and busied with getting his train back into the siding, he stepped into the up road, and was struck by the buffer-plank of the "Irishman," which sent him spinning into a hedge. Jack Roland, with a glass eye, was struck with the fragments of a ginger-beer bottle when about to hail an old comrade who was with an excursion train. Dick Anderson, with a silver cranium, put his head out of his van in a tunnel, and put it out too far, so that the "bird-cage" of a passenger train knocked it back again, with sundry defects. Bill Preston, with a platinum nose and artificial arm, was "fly-shunting," and fell between the trucks; some of the wheels ran over him, and deprived him of two members. In such company, the young fireman hears the story of a smash that made the hills rattle again, and piled the waggons up into the air; and how Tom Hassock was found under the débris, alive and well, inside an empty sugar-cask. Jim Jeffery, a short, thick-set man, with coarse features, two or three warts on his face, and one eye nearly closed, relates a story how he made half-a-dozen men jump nearly out of their hides, who were taking their breakfast inside a box-waggon in a goods warehouse with closed doors. He had three waggons to leave at the place, which was situated at the bottom of an incline. The waggons were detached from the train at the top, and slowed down the incline by the guard, who rode upon one of the waggons so as to control the brake. The incline was a long one, and Jeffery, who had been down many a time before with waggons, knew the maximum speed to allow before beginning to slow. Placing his foot upon the brake-lever, he pressed the brake-block against the wheel with the whole of his weight; and had scarcely reduced the speed when the block slewed off the face of the wheel, and Jeffery was on his back in an instant on the road. The trucks ran away without anything to impede them, until they drove right into the shed-door at the south end, knocking the box-waggon and men out through the north door, up against the scotch-blocks outside, and were only prevented from following by the outraged wooden structure falling bodily into the top of them. Jim Jeffery was a great treat with his quaint looks, and story-telling attractions; and, when he once began his stream of anecdotes, they flowed like oil from a barrel. Such are the kind of peeps a young hand gets of the troubles that railway men have to contend with.

After a fireman has been engaged in forming trains, and has learned to distinguish signals, and to ply the shovel pretty freely, he is promoted to the platform of a goods-engine—the pick-up goods—running from station to station, setting "off" and picking "up" waggons; leaving a crate of fowl at Four Ashes, a flitch of bacon at Spread Eagle, and a barrel of flour at Penkridge. These are called box goods; and by shunting at different places for the passenger trains and express goods, he learns the position of signals, the road, and the traffic. It is this kind of knowledge which a man requires in order to work locomotive engines without over-shooting the signals, or the stations, or delaying passenger trains. However well a mechanic may understand the mechanism of an engine, he would be completely lost with one under steam on a strange road.

With slow goods-trains, any little heating, or heavy firing, can be rectified without causing any delay; and that such things do happen with young drivers and young firemen is well known. They are both under training; the former to feel his position as a driver, and the latter to learn how to work so that at all times he may be able to perform his duties *in the right way*, and no other.

On slow goods-trains the fireman is permitted to do a little oiling; that is, to handle the oil-can, and fill up some of the syphons on the road, and tallow the swabs suspended on the piston-rod, and valve-spindle studs. Beyond filling up on the road, he is not allowed more oiling by shrewd drivers, who like to oil the engine themselves before leaving the shed, so that they can see if all the trimmings are in the syphons and boxes; for "ratting" goes on about a railway as well as in factories; he can also see if the trimmings are working and passing the oil.

Some drivers who have had hot big-ends or hot slide-bars, and been obliged to give up their trains, have rather prized the opportunity of showing the foreman that the syphon was actually full of oil at the time of the accident, and that therefore there could not be any negligence. But the proof of so much oil was a proof of negligence, and showed that the trimming had become old and worthless, being no better than a cork, and would not work. From oiling he is allowed to advance a step further, and take the management of the fire into his own hands, and feed the boiler with water. Should he happen to be with a driver with no instructions to give, he will find ready for his use in the tender any amount of coal, and he can blaze them away like "steam." Should the engine be "ticklish" with a thick fire, he takes the rake, or a "splice," and works at it until it is his master. The driver then takes hold of the irons, and, with some Wigan flattery, swears they shall stick for steam. The fireman, having had no experience with a choked fire, thinks it is caused by some extraordinary difference in the quality of the coal. Soon after, he chokes the fire effectually, and when brought up for it, he learns for the first time that a choked fire means that there is too much on for the load, and that the blast in the fire is not sufficient to pull air through the coals out of the ash-pan. It is a very simple case, and is soon told; but hundreds of such cases have happened to young firemen, for want of instructions from the drivers.

With some drivers, however, a young fireman is soon on the right track, for they like things done properly, and in an efficient manner. Some drivers, not given to complain too soon, if they cannot bend a man into right ways, find their foot-plate soon becomes too hot to hold the "bloke," who goes to his foreman, and states he has been *spitting blood*, and asks for a lighter birth. With slow trains, the fireman obtains a further insight into the dangers attending locomotive life; such, for instance, as being knocked off the tender by bridges which span the railway, or by columns which support them, or by going underneath an engine in a siding without seeing that the tender-brake is hard on. He also comes in contact with disabled engines with broken crank-shafts, broken excentric-rods, excentric-straps and sheaves, broken motion, and broken springs; and he obtains an opportunity of seeing how, under such circumstances, engines are temporarily repaired to get them home. Above all, which is the most important, he hears, if he does not actually see, what has been the cause of such failures; and he is therefore, so far as possible, cautioned against running into the same dangers. If the question were asked, Do firemen break engines down? we could state many facts to prove that they do. It may be both interesting and useful to mention a few instances, like caution-boards stuck up by the side of a wood, intimating that "man-traps" are concealed under the leaves and ferns.

Foremost appears on the list the bugbear, a choked fire, which in thousands of cases has upset the working of all classes of trains from slow goods to fast expresses—especially so a few years ago, before any system of firing was introduced. Firemen have neglected raking out the ash-pan, and thereby brought down the fire-bars and the fire into the ash-pan; they have neglected to protect the bars before making up a fire; they have neglected to fill the tender at a water-crane—taking a splash of water to indicate that the tender was completely filled; they have neglected to fill the sand-box, and the engine has in consequence slipped and slipped until a crank-pin has broken; they have been intrusted with the oiling too soon, and not knowing how much oil such and such bearing should take, they have been satisfied with the performance of filling the cups to the brim, and at the same time provident and cautious not to waste any oil, and not for a moment suspecting their own want of experience in oiling. There is not the skilful keenness of perception requisite to detect deviations, and indeed his mind can only be trained by the hard-earned experience of disappointment. A big-end or an excentric starts cutting its bearing after he has oiled it, and suspicion falls upon him. It may happen that the engine is effectually disabled, and in the face of a heated bearing, what proof has he to show that he performed his work honestly and thoroughly, for the heat has burned out the trimming, and the oil has fumed away? When there is no apparent possibility of a proof for good or for evil being obtained, flesh and blood become weary, and the effect is unpleasant. The driver and his fireman are apt under such circumstances to indulge in weak complimentary language, and the skin of each becomes so thin on such occasions, by sputter and retorts, that it is ready to give out. After a failure or two of this kind, a fireman begins to be weary of himself; but the railway people know that he must learn for himself in the morning of life, and he goes brooding upon his small stock of material, counting upon results oddly enough delusive. How a fireman may obtain information, how far his surroundings must be his teachers, how much he will owe to inspection, and how much to the kindness of his drivers, it is difficult to say; but we know this, if a fireman is to become a workman that "needeth not to be ashamed," he must not be disappointed if some one tells him that in locomotive engines and locomotive working there is sufficient material to fill some scores of books, and that the only way to make it one's own is to go into the work with a will, and steadily follow it up.

If a question presents itself to his mind, to which he cannot return an answer, as, for instance, what is the meaning of the throw of an excentric? he must make a note of it, and accumulate bit by bit what he can about the matter. In all probability, he may have to throw away much of his gatherings; but let him be encouraged by knowing that his experience in that line is not exceptional.

The labour is not lost, for the process of recording either in notes or by observation, tends to give a fuller and more permanent possession of the facts and thoughts.

From a question on the links of the motion to the laws that bring about half-a-dozen bursted tyres in a frost, there is much on which a fireman's attention may be directed. From all sources—from locomotive running, and the working of the traffic—he may be able to read events in their approach, and disarm them of their power.

It is not an uncommon feeling for any one to think that great things can only be accomplished by working at great subjects, and, after a fruitless attempt to make a startling discovery, or to prevent a great calamity, they think they can do nothing, and they become despairing. Upon the railway nothing should be regarded lightly.

From firing on goods-engines, where he is supposed to have learned all about firing, all about oiling, all about signals, a fireman in time climbs, by order of his foreman, on to a passenger engine; and it would be idle to try and prove how welcome this promotion is after from three to five years on the goods-engines. The hours on duty are much reduced now, compared with what they were. But eighteen or twenty hours a day on duty have been a very common occurrence, on an engine without any weather-board, and with wet sand-boxes, and in all sorts of hard weather, and we suspect in some instances with hard fare—very hard; but they have been buoyed up with the thought that their passenger days were ahead. Very few firemen give up the pursuit, for the simple reason that many of them, with a pause in their shovelling, have thrown a kiss to a milkmaid, and wedlock has been the result, with eighteen shillings a week and overtime. And many couples dwell together as a pair of roses. There may be weary trips in cold weather, and danger; but there is ease of mind, and the humble meal is eaten with much love, and what the dinner basket does not contain the heart does not crave after. But, mingled with affection, the young wife soon learns the dangers to which the persevering husband is exposed—the toil, the struggle, the hairbreadth escapes. She feels the heart-ordeal may be hers after her neighbour's is over; and such thoughts eclipse half the sunshine of her home and life. But that young heart is strong in faith, assured that there is no limit to answered prayers. In the year's roll of accidents to railway servants we find that, taking averages, a fireman is killed every fortnight, and two permanently injured every week, while performing their duties. It would be well, with the hope of saving some, to note how, when, and where some firemen have been suddenly overtaken by the hand of death. It is impossible to disguise the fact that many firemen lose their lives through the drivers moving the engine while the firemen are underneath, owing to the latter having gone there without mentioning it to the driver. Several very painful instances have occurred in which a brother has killed a brother, a father a son. In one instance which occurs to the writer's mind the son decapitated his father. Now, in most cases of accidents by the machinery of the engine, a most important duty has been neglected—the sounding of the whistle before moving the engine has been omitted to be done. In the instance of the brother fatally injuring his brother, the poor young fellow was underneath the boiler oiling the big-ends, and his brother was asked by the station-master to make some shunts for him, when he, as smart a driver as ever stood upon a foot-plate, jumped on to the foot-plate and put on steam. It was entirely through his desire to act promptly that caused him to move without whistling. The young man was crushed in the motion instantaneously. In a case of a father killing his son, it occurred through the latter sitting across the rail to pack a pump-gland. His father thought he would screw up some of the piston and valve-spindle glands, and, seeing from the foot-plate on his own side that the engine was not right, he put on steam, and instantly cut the lad's legs off across his thighs. What man can guess the sorrows of the father when he heard the frantic scream of his son—his only son—his only child? And all this grief was caused by not following a simple rule. The case of the son killing the father happened almost in the same manner. The son moved the engine to get it into a right position for oiling, and the father was looking and feeling on the other side of the engine at a big-end through the spokes of the driving-wheel, and over the outside connecting-rod, which crushed him between the edge of the running-plate and framing.

But in all these instances, we repeat it again, the fatal blow was given through not sounding the whistle before opening the regulator—a practice which should always be carried out; and if a man, either a driver or a fireman, should be seen to omit it, he should be made to forfeit five shillings, which should go towards the Widows' and Orphans' Fund. Extreme danger is risked by going underneath an engine without taking the precaution to put on the brake. Scores of men have been killed, and hundreds have lost their limbs through it. A young fireman, just on the point of being promoted, lost his arm this way; he was raking an ash-pan out on to a main road, and was just coming from underneath the engine, when some waggons were shunted against the engine, and cut his right arm off. This sad accident, be it said, was caused by three rules being neglected. In the first place, the ash-pan should have been raked out clean before the engine left the shed, and this was not done. Secondly, no ash-pan should be raked out on the main road, because if the ashes do not get struck by the big-end of the engine going over them, when they become dry they fly about into the motion. Then, once more, no one should venture underneath without seeing that the brake is hard on. Not only firemen, but drivers, have done this and been crushed to death.

Not a few men have run to the back of a tender for a fire-iron, or for something out of the tool-box, and been struck by a bridge and killed on the spot. The writer was once struck down by one, but miraculously escaped being killed, through the engine happening to be going tender first. Several express firemen and drivers have been killed through leaning over the engine too far, so that they came in contact with some pillars supporting a bridge or the covering of a platform; and some very smart, promising young men have been killed when oiling, through not maintaining their hand-hold. One was letting tallow into the cylinders in front, and the engine at the time was just coming over the top of a bank, and the waggons gave a sudden snatch, owing to the steam having been shut off too soon, which gave the engine a sharp check, and he fell over the buffer-beam in front and under the engine, the wheels of which cut off his legs. Another was oiling the motion from the framing, and when the engine entered through a pair of points in a sharp curve, causing it to give a lurch, he fell off and was run over by the whole of the train, and was quite dead when he was taken up. There is no doubt that many such accidents could be prevented if the men would not be so self-confident; and, what is more to be deplored, these accidents, which bring sorrow and sore affliction, do frequently occur to the best of the men, whose judgment one would be inclined to think would make them wary of danger. But there is no doubt that living, moving, and breathing in an atmosphere of danger daily does harden the nerves, and tend to make men careless, and to furnish their minds with a notion that they are exempt from suffering, or from a dreadful death. Not many years ago, a fine handsome young fellow, full of life and hope, left his engine for a second, at a station, to speak to a lass who was to have become his wife, and when the guard blew the whistle the driver, as a matter of course, started the train, and the fireman followed. The train was not going very fast, but the steps of the engine were slippery with the grease from an axle-box which had been running warm; he jumped up, and his foot slipped, and he was cut through the middle instantly, for he jumped before he had hand-hold on the rail, a plan which all men should avoid. When the engine is in motion, where there is the least degree of risk, the hand should in all movements take precedence of the feet. On passenger-trains a fireman has to perform pretty nearly the same duties as he did upon the goods-trains, but with some important distinctions. The generation of the steam is the same, the coal is the same; in many cases—in fact, in most cases—the boilers are the same, only they supply steam to move round a larger wheel at a higher speed. But, on the passenger-trains, the fireman has to take charge of the fire and feed, he makes up his own fire, he manages it himself, he fires when it is necessary, he knows the difference between good and bad firing, between good and bad coal, and how to get along with small and large coal; he keeps the steam up, and the boiler safe with water, for hundreds of miles in the course of a week without any instructions being asked for, or thought necessary to be given by the driver, who has his own duties to perform in attending to his engine, in listening to the beats, in seeing the signal all right, in observing the movements of the passing traffic, and following out the instructions of the weekly and daily notices.

The duties the fireman has to perform on express engines may have been partially learned, or completely learned, long before he left the goods-engine. But, on the express engines, he has to accelerate the speed of his movements, to economise his time by thinking beforehand, and to get through his work without hurrying—without making unnecessary work. He must mark right in the centre, if you will, and make " bull's-eyes " every time. To work as a fireman on an express, he must, to give satisfaction, have studied separately every question connected with the working of the engine; he must have questioned the reason of all things until the marvel became only a portion of his knowledge. From the fact of engines failing through choked fires, he finds there is a law which governs combustion. It is no longer a mystery; he can divine the cause. Too much on? he can expound the reason. Too little blast or air? he can predict the result—shortness of steam. From the fact of a box heating, he can reason in the same way and apply the remedy. So, then, in his experience chance has no existence; and coming upon duty, and while on duty, and when off duty, he knows that for similar effects there are constant causes; and to avoid accidents and failures, to which firemen can contribute, he must remove the cause, and see that it is kept at a distance. In the performance of his duties, he has much to think about, as steam must be made as fast as it is required. Every shovelful of coal must find its proper billet, and the shovel on fast expresses must move between fire-door and coal as though it were too hot to hold. That foot-plate is the most free from disorder, most replete with purpose, on which intelligence is to be seen in every act. There, there is power to fathom all things pertaining to locomotive work and railway running.

CHAPTER IV.

THE ENGINE-DRIVER—HIS PROGRESS.

WHO are these? They are those who take charge of a locomotive engine when under steam with a train. They began as cleaners, and, advancing step by step, they attained the position of firemen, and still marching on through the various degrees of promotion, laying themselves out on this side and on that, cherishing and making much of whatever aptitude they found in themselves until the harvest of reward comes. On the foot-plate we see only, in the position of driver, a man who has reached the regulator through many vicissitudes, break-downs, collisions, explosions, dreadfully cold nights, and still more dreadful dangers, always moving amidst a ceaseless change of things, himself unchanged. If we were to sum up the conditions on which a man can command the regulator of an engine, it would read thus:—Miles to run, 200,000; coals to break up and put into the fire-box in their proper place, 3,000 tons; day work, 3 years; night work, 4 years; Sunday work, 25 days per year; innumerable hairbreadth escapes, eyes constantly on the roll, the mouth shut and the ears open, an iron constitution, a whistle in the lips, a warm heart, and an intelligent head, with the motto, "Wait."

We see, then, on the foot-plate men who have been well drilled for the work, who can pride themselves upon having one qualification if no other—loyal servitude. Before they obtain charge, they have, as a matter of course, been scrutinised by those who have the welfare of the service at heart, and who are desirous of bringing to the front such men as will tend to give satisfaction to the directors of the railway and to the public.

The localities where such men are to be looked for are the foot-plates of the express engines; they are there simply by merit, by having achieved results.

Some work their way more rapidly than others—come to perfection sooner—looking like promising fellows in the gait, in the look, and the tact with which they go about their work. If a man works his mind as well as his shovel, it gives to the character a manly bearing. He faces difficulties and disappointments with no obliquity in the vision, with singleness of eye, and a oneness of purpose, in the midst of boundless trivialities so called.

From better to better. Every-day things must be done better and smarter to-day than they were done a month back.

Work upon the inner man and it will tell upon the outer man. It will not suffice to limit ourselves to the bare acquisition of such knowledge as is absolutely necessary for present purposes, we must stretch out on this side and on that, cherishing and making much of whatever we find within us. We must let nothing slip, but confront every locomotive and railway question coming within our sphere with a determination to shake the truth out of it at any price, and proceeding on to the next puzzle, working heartily and thoroughly in a manly spirit, rising slowly and surely to perfection, if perfection there be.

They are not all models on the express engines, either in appearance or for picking up the irregularities of foot-plate life and throwing them overboard. To some men everything is proper. Nothing looks more reasonable than to expect that a young driver who has been brought up on the foot-plate with a first-class driver should start well, continue, and end well; but in scores of instances they have ignominiously failed as drivers, by committing all the blunders that locomotive driving is liable to. We shall have no difficulty in tracing the cause of this. All of us more or less ignore the teaching of facts, as facts are in relation to other folks and not to ourselves.

Every locomotive superintendent knows that scores of engines have been disabled through the drivers attempting to leave a siding before the points were open, when, consequently, the engine was "trapped." There is not a line in the country without traps of this kind; and there is not a driver on these lines but also has either seen or heard of their comrades having their engines de-railed in them; and yet, the drivers knowing this, there is an engine off in these traps on some lines every week. Not twice in charge of the same engine-man, but very likely by another who knows that such points exist, but did not realise them until his own engine was in them.

Is not this a fact? Again, many engines have been disabled through screwing glands up and breaking a stud on the road, at some roadside station far away from the means necessary to replace it. We will allow that in all probability all studs that break are defective and liable to break, but the point is, after a failure of this kind, how it is that a driver will persist in trying to do the same thing after he is fully aware others have crippled their engines by it. One man disabled his engine several times by interfering with glands on the road, and at last he adopted the sensible plan of doing to them all that they required in the shed, and his engine works just as well, and he is thought a deal better of by not breaking down so often. It is one of the hardest things in the world to appreciate what is before our eyes and within our grasp, and it is only a superior character who can see facts appreciably and appropriate them with a charm equal to making a grand discovery. No man can become a first-class engineman without having this philosophical quality. It would be easy to prove that ten men's failures will not, in hundreds of instances, save the eleventh from going and doing the same thing, with all the facts of their oversight or want of presence of mind quite fresh in his memory. Facts, as related or connected with other people's experience, teach us nothing, and they float away to the great ocean of the past, *unless* we catch them as with a hook in the jaw. This is not a faculty that comes of its own accord, but if exercised it becomes easy, as the tapping of a musician's fingers over the keys of an instrument seems easy. The driver who never discovers the cause of any other failure than his own must remain all his life with a millstone of uncertainty around his neck, which at any unexpected moment may engulf him in a great disaster. On the express engines we behold men who are supposed to possess sufficient knowledge of their engines to distinguish the nice shades of irregularity from perfect enginemanship, and deviations from sound genuine engineering in the boiler and machinery. How shall the driver tell what deviates from the right, and how would a driver stand for a first-class engine who depended alone upon his own experience? He would not know a tenth part of the ways in which it is possible for engines to go wrong; and he himself would look upon every new-fangled scheme as a discovery. What is required, then, beyond experience? Close observation and *great* general knowledge of railway engines, so that a driver can diagnose complaints, and prescribe a remedy.

The science of locomotive-driving is based, then, upon experience and observation.

Observation means that power by which a driver can for a time get into the position of those who have different experience from his own, as he does not want to knock a cylinder-end out by breaking a connecting-rod through a big-end seizing, in order to feel all the sensation of a man who has had such a misfortune. He must, therefore, see through other people's eyes, and feel with other people's senses—not his own. It requires a vivid imagination to know how other people feel under given conditions, and one must see from within and not at the smash without; we must almost undergo an actual experience, rather than observation simply, if we would avoid the "traps" through which many fall—many who, in spite of serious blunders, may possess a steady eye and a sound head. Every break-down upon the line may furnish matter for observation. "Here," it seems to say, "are the facts, make them your own, and what you can of them." Given in their own most downright shape they stop us, and, as it were, rivet us to them not obliquely, but so that the nip of the rivet may bring the facts home straight and square, materially influencing the ultimate strength of our character. There is no second-hand manufactured experience worth a rush unless it is properly assimilated and transformed by the mind into our own life, and that without stepping one hand's breadth beyond the most literal and unmistakable of facts, without altering one defect, omitting nothing, and smoothing away nothing. When we see driver Not-Particular or driver Never-well-to-do going up to receive his sentence, let the unpalatable truth come home, and let us ask ourselves what makes us differ from them. "There I go for not looking after a distant signal in time;" or, "I am suspended because I allowed a gland to work off." After this fashion every time the fine-sheet comes out, erase the name of all the drivers and write in "Jack, Bewarey," and read on; and write under the last case, "The portrait of a man who has relied on his own experience and failed."

We see, then, that things appertaining to the foot-plate find their place in men's experience, and but little in books; and so it is on the foot-plate that we must now proceed to take a glimpse of a race of men, or a class of men, who do good service for their country. When a fireman is passed for a driver, the promotion is, as a rule, in his own mind, twelve months or two years behind time. But a man is generally about five years before he is capable of taking the responsibility of a driver upon his shoulders. Of course, railway companies recognise the great principle of individual exertion; they make every man in the service stand *alone* upon his merits, and strictly accountable for the rapidity of his own promotion. It is the principle that appeals to that Anglo-Saxon energy which performs its own part without looking round to see what others are doing. The space and facilities are grand for every man to raise himself to the perfection of an employé on the locomotive; but the pyramid of his attainment, as already referred to, must be of his own designing and building. With all the advantages of working and travelling, seeing and hearing, if a fireman cares not to raise himself above animal servitude, he will always have a deal of mud and slush about him to discomfort him, and his level will be that of trite humanity. But if he erects for himself a high standard of excellence and despises mediocrity, he will soon find himself raised from the fluid shifting mass some feet, and sufficiently high to look *down* and into every question connected with railway working. Let there be no misunderstanding; promotion depends, like reaping, upon sowing. The farmer sacrifices a certain portion of his corn in order to gain a harvest; a fireman must sacrifice a portion of his attention in order to qualify himself for his business as a driver by gathering a mass of miscellaneous information, arranging and labelling it, ready for use. The outward and immediate results may appear to be worthless, unknown, and unsuspected; but the tone of uncertainty about the toil brings out the character. The flower and fruit of such toil pushes out of the way the strongest obstacles. The railway locomotive superintendents need men for their engines just as much as men need engines, and those firemen who are distinguished for their fulness of knowledge of the engine and the exigencies of the service are selected.

The *elixir vitæ* is self-help. "Make me a great man," said the brother of a bishop. "Brother," said the bishop, "if your plough is broken, I'll pay for the mending of it; or if an ox is dead, I'll pay for another; but a ploughman I found you, and a ploughman I must leave you." When a fireman is promoted to the position of a driver, in the capacity of a driver he begins to undo his wallet of information. He is no longer under the eye and instruction of a driver, and woe be to him if his stock is trash, such as was, and is, and ever will be found amongst those who clutch everything that comes in their way, and who give it away again because it is worth nothing.

Drivers are drivers; their engines are selected for them, like their positions, by the foreman, who has under him a staff of men and sub-foremen to prepare the engines for the road, and to have them in steam for the drivers to work. It may interest some persons to follow more in detail this process of preparation, as everything in connection with locomotives is becoming more and more particularly interesting to the public.

In the running-shed there are gangs of men told off for certain work, and no other, with a foreman over them. There are the fitters, who do all repairs—temporary repairs; there are the coal-men, who coal the engines; there are the washer-outs, who wash the boilers *inside;* there are the cleaners, who clean the boiler outside; there is the turner with his men to light up, and raise steam by the time the driver is booked on duty.

When the driver went "off" duty, he told the coal-men how much coal to put on the tender, and what kind of coal, if there were several kinds at the coal-stage; and if Welsh coal was amongst them he would be sure to ask for some, whether he got any for asking or not. If the supply was rather limited, and the driver one of those straightforward men who never "tip," the chances are he would get none. The ganger of coal-men writes down in a book the amount of coal he delivers to each engine, and this is compared with the number of miles run by the engine, and the weight of coal consumed by each engine in a month, divided by the miles run, gives the weight of coal in pounds consumed per mile, and by this means the superintendent finds out *the man* who is the heaviest in fuel, and *the man* who is the lightest in fuel.

A monthly sheet is made out and posted up in the running-shed, setting forth the various shades of good and bad enginemanship, by informing all and sundry how much coal each man has burned per mile. It is fair work to get on and keep time with Welsh coal at 25 lbs. per mile; with Derbyshire coal at 28 lbs. per mile. A standard is fixed by which the men's work is estimated. On some lines the drivers are allowed 14 lbs. of coal per mile per engine, 1½ lbs. of coal per mile for a carriage, and 1¼ lbs. of coal per mile for a waggon. So that if a driver made a run of fifty miles with eighteen carriages, on the above standard scale, he would be allowed in total, for engine and carriages, 2,050 lbs., or 18¼ cwt. of coal; and if he performed the journey with 12¼ cwt., he would obtain sixpence, or one penny per cwt. Coal premiums have been much abused, and by good drivers they are thought very little of as a measure of ability. It has been found out that the outlay of threepence in a pint of ale would, in some cases, land 6 cwt. of coal on a tender, and the coal-man would never see it; and the next tender that came would receive 6 cwt. without the tender feeling the weight of it, and still the coal-man saw it put on. (This for philosophers.)

Then, again, a driver and a guard managed to do a little quiet business together, and at the end of the month squared up. The guard holds a ticket belonging to the driver, on which he enters the time of departure from one station and the arrival-time at another, together with the number of trucks attached to the engine, in order to show how much coal the driver should consume in hauling them between stations.

The guard booked fifty waggons, when there were only thirty, so that the driver would obtain credit for twenty times 1¼ lbs. of coal per mile for waggons which he never saw.

This work went on for some time, until the bubble burst, and then all the coal premium that enginemen—there were several in this predicament—had taken in their lives—in some instances £20—they had to pay back in weekly instalments of 5s. each, and forfeit all their share in premiums for the future. This was stiff punishment, and still not too severe, in order to produce a good effect throughout the whole body of enginemen. After an engine is coaled, it is taken into the shed and cleaned inside by the washers twice a week, and outside every night or every day by the cleaner. About three hours before the engine is required, the bar-boy comes along with a torch-lamp, steel broom, and fire-bar lifter, and enters the fire-box to clean it of clinkers, to sweep down the tube-plate, and to rearrange the bars. After him follows the fire-lighter with a short shovel and hammer: he breaks a few lumps of coal up on half-a-dozen engines, and then goes to the furnace, where about a ton of coal is all on a blaze, and shouts out "Fire, fire." The foreman cleaner hears this, and dispatches half-a-dozen youths to carry fire in long shovels on their shoulders to the engines. This done they go to their cleaning again. The fire-lighter adds fresh coal to that which is now just put into the fire-box—about 1¼ cwt.—and after he has assured himself that it is lighted, he, in his rounds, looks in on it occasionally, and takes stock of what steam the engine is making. If an engine is too forward, he lowers the damper, and if another is too slow, he exerts himself to forward the fire, either by putting wood on or getting the engine under the "blower"—a contrivance that has cracked many a boiler. It consists of a piece of tubing (¾ inch), having one end in the chimney of an engine and the other attached to a boiler containing steam, which is allowed to escape by means of a cock through a pipe. As the steam issues from the orifice of the pipe, it induces a current of air to ascend through the fire, the tubes, and the chimney—in fact, it blows up the fire. The same effect, though in a different manner, is produced by running an engine about in reversed gear by means of another engine.

Following the fire-lighter is the shed-turner, who is responsible for the engines being in steam; he now and again pays each engine a visit, and casts his eye at the steam-gauge. More than once, since railways started, the turner has looked and looked for steam in vain, and then found the boiler red-hot, having been lighted up without water in it. Such cases are rare, but when they do happen there is the "sack" for the fire-lighter, a fine for the turner, and the postponement of an increase of salary for the foreman. Again, there is the fitter; he contrives, if possible, to do all the little repairs required before the time is due to leave the shed.

All the repairs which the drivers think are necessary, to work their engines and trains with punctuality, are entered in a book kept for the purpose, in charge of the foreman fitter, who, under a printed heading, writes down opposite each case the name of the fitter he has chosen to do such and such work. Amongst his men he finds those who can let a big-end together better than others, and nearly every one has an aptitude for some special work, on which he is mostly employed. One man is noted for making joints, another for lifting and putting in a brass, another for valve-setting, while some are of no note or likelihood.

When the driver arrives, his engine is ready for him—coaled, cleaned, repaired, and in steam; and he takes possession at once, about an hour before train-time. The engine-men are in what are called "links;" that is, groups of from eight to a dozen, as may be required, to work the expresses. Then follow second express-men; then men for fast passenger-trains, which make several intermediate stops at stations, past which the above "fly" by; then men for slow passenger-trains; then men for slow trains. On the goods-trains the like order prevails—express, slow or pick-up-goods, and short trains. There is an auxiliary "link," consisting of engine-men who are ready with engines to go and do anything—"banking," "piloting," and "shunting." The "bank" engine-men wait with their engines in steam, coaled, and watered, near to the passenger-station; and should an engine-man come up with a disabled engine, he hooks "off," and the bank engine hooks "on," and takes the train away; and the crippled engine proceeds to the shed for repairs. Or should an engine-man come up who finds, owing to a heavy train, he is losing time, he obtains the assistance of the "bank" engine, taking it with him in front as far as he likes. He will not take the bank engine if he can avoid it, because an engine in front smothers the one behind it with dust or slush, which is apt to get into the machinery and start it heating. A bank engine-man must know his way about the line. The pilot engine-men assist other engine-men who are strangers to the part they are about to pass over; but the term piloting is generally applied to engines which assist the goods-engines as the "bank" engine does the passenger engines. The shunting engine-men marshal the waggons and carriages about the yards and stations, and get them ready for the main-line engines to be attached to them as soon as they come out of the shed. The shunting engines reduce the hours of the main-line men, which allows them more time for rest; and, besides, it enables the train engine to get away with a fire intact. When the train engine is messing about and shunting, it pulls the fire about and causes the slag in the coal to run, which, meeting with no blast, settles upon the bars, and clinkers them over.

There is a class of engine-men who have no engine, but carry a shovel and gauge-lamp, and their firemen carry two lamps. These are relievers. Some half-dozen of them occupy a cabin at the end of the passenger-platform, and in their turns they take charge of the engines from the main-line engine-men, who get straight off their engines, and walk to the steam-shed, where they enter the repairs they require in the book, and talk for a few minutes with other drivers of what they have seen and heard on the road. It is not an uncommon thing for two drivers to meet in this way, who, four hours previously, were three hundred miles apart, having come one hundred and fifty miles from opposite directions. The relief-men take charge of the engine, and put their own lamps on. The lamps and tools belonging to the engine are locked up by the fireman before he leaves it; otherwise, the next time he comes on duty he would find that somebody had taken them. The relief engine-man and his mate—they don't call him a fireman—take the engine to the turn-table, and turn it round if required, and then run it to the coal-stage, where they leave it under the charge of the turner after they have looked it round. These men return to the cabin and take their turn in relieving other engine-men. But it sometimes occurs that the trains are late, and then there is an interesting group in the cabin, and what one doesn't know another does. They soon begin controversies concerning whatever may be the chief topic amongst them, and at a large engine depôt there is plenty of food for conversation and serious thoughts. When the writer was a relieving engine-man's mate, often the table was made to dance again by some one registering his protest either against spiral springs or mid-feathers. Some were for steel cranks and cast-iron wheels. The performance of steel as a material for constructing fire-boxes was not very satisfactory; up to a certain point steel was allowed to be (*sic*) very good. If it was very good, it would be perfectly homogeneous and free from imperfect welds and internal defects. Light was thus thrown on the quality of steel, when some one, more noisy than convincing, would bring his gauge-lamp down upon the head-lamp, and glancing at the smash, would declare that in all cases the quality of the work depended upon the striker, whereupon there was great applause. By the time the caboose was becoming welding hot with a debate on the meaning of the word "homogeneous," some one would bring a man's leg in, or a woman's bonnet, or a cow's tail, or half the side of a pig, or a horse's head with his eyes staring like two red tail-lights; sometimes something cooked would be brought on to the table out of the engine ash-pan, and it was very rare that anything was brought which could not be faced. The most provoking thing was to see a reliever come into the cabin, and after paying some driver a sort of compliment, place upon the table what at first looked like a roasted hare. Some would cough a hesitation to taste, others thought it was a roasted dog; but this being rejected as too wild an opinion, it generally left the table by the hungry relievers being all persuaded that it was a rat-policeman, accidentally killed whilst doing duty for some farmer.

But on one occasion, one was called upon to do a duty for all. The cabin had no oven in the grate, and those who had a veal or figgity pie—potatoes, bacon, and a crust—to warm, had to take it over to the shed into the general cabin. The oven there was a mystery, and pies would vanish out of it, in spite of several standing round the door to watch it. But, one night, the gas in the cabin was turned off, and an engine-man was sitting on his haunches turning his pie round, and he spied through a hole in the brick-work the coal-men eating their supper in their cabin next door. Not suspecting anything, he mentioned the matter in a casual way, and the little talk struck the ear of a sharp wide-awake fellow lying on the seat. "See through into the other cabin," he thought; "well, here is a joke, we have been bringing pies in on this side, and they have been taking pies out on the other side." Quietly, the oven was examined, and it was found to be a very ingenious trap. At the back of the oven was a cupboard, and at the back of the cupboard the oven, and the two communicated with each other by means of an iron slide, worked inside the coal-men's cabin, and arranged within the cupboard. As soon as this was found out, it received that attention which the gravity of the subject required, and it was decided to make a dog-pie of the first dog that came to hand, which soon happened. The pie was put into the oven, and in a very short time it vanished through the slide, but only to return again with the crust intact, but most of the inside taken out. There was a thorough understanding that the coal-men should be watched after they left the cabin, in order to see how they carried the bait. It was suspected that the bait was insufficient to have the intended effect; but one or two grimy and smoky faces were seen to possess eyes which rolled about like those of maniacs. It was easy to read the momentary struggle in their minds between the desire to be calm, and the thirst for revenge.

The relievers' cabin-door was close by a water-crane, and above it was another coal-stage, from which the main-line engine-men could take a tub or two of coal without hooking off their train.

The chimney of the cabin was built in the wall of the coal-stage, and when there was a good fire in the cabin-grate the coal-men would lean their backs against the wall in cold weather, so that the idea of taking revenge by blowing the cabin-grate up from above appears to have been readily decided on. At a convenient hour, a brick was withdrawn from the chimney by some of the coal-men for that purpose. During the fore part of the night, the expresses came in rather fast, and it was not until two to three o'clock A.M. that "trade" began to drop a little, when most of the relievers and their mates gathered round the roaring fire, by the side of which there were, on this occasion, several tin bottles containing tea, which had been made several hundred miles away, having been collected from the drivers' cans. Nathan Gordon, with his fine outline of face, quiet, and wholly unacquainted with nervousness, was frizzling a pork chop on the coals. Sam Holt was fastening a sprig of mistletoe on to the gas-pipe, and Gordon and others were looking up at him, for he stood upon the table, when the grate blew up, putting out the gas, scattering fire and cans in every conceivable direction. The scramble to find the door was awful, for although it was known to open inwards, nobody then appeared to know for certain which way it opened. Some insisted it had opened outwards for years; some were feeling for the latch near the hinges; and others were of opinion that persons outside were holding the door. At last the door was opened, and the coal-men entered, when a struggle took place, by which the table was instantly demolished, followed by a burst of yells as hideous as ever affrighted a savage. With unrelenting fierceness the fight went on, until every panel in the door was knocked out, and amidst the wildest confusion and the thickest of the fight, some one turned the water-crane on right into the cabin, and with four or five tons of water washed the "tigers" and "diamonds" literally out on to the line.

The explosion was caused by the coal-men dropping some fog-signals down the chimney into the fire.

It is with the relievers that a young engine-man is first appointed, without an engine, and without much responsibility; he is, in fact, very kindly "let down" into his position. From this work he goes piloting, and as the best of the engines and the best of the men are on the best of the work, he finds himself in some queer company sometimes as regards engines. It is at the beginning of his career that he will be called upon to bring out all that he knows, and apply it at a moment's notice, or to act with great firmness.

He would be an exceptional engine-man who could not look back and be able to relate a number of personal adventures when he drove a different engine every day in the week, as is often the case with pilot and extra engine-men. They are called upon sometimes to hook on to a train with an engine they were never on before. They know nothing of her steaming qualities, and they have to find brains to steer clear at times. The spare engines are in all the spare engine-men's hands, who often leave the marks of their individuality of character upon them. A driver had an engine that would not steam, but he managed to pull through with her, and he found that he should be in charge of that engine for another week. What should he do to make steam better? To make more steam than she did, meant more heat, and more heat meant more blast on the fire, and more blast could only be obtained by contracting the orifice of the blast-pipe, which he thought *was* already rather too small. Could he manage it in any other way? Yes. He fixed some old piston-rings in the chimney, and reduced the internal diameter, so that the exhaust steam was free to leave the cylinder and blast-pipe without causing any back-pressure, and it was more efficient in the chimney for creating a strong blast upon the fire by creating a better vacuum in the smoke-box. Now, unless a man had thoroughly studied the action and principle of the blast, he would not have "stuffed" the chimney. It is possible, finding the engine shy of steam, he would have hung a hook on the blast-pipe, and thus have reduced the area of the orifice, and so have sharpened the blast, which would have affected the fire, though in all probability it would have created considerable back-pressure. The driver managed the piloting very well and very comfortably with the rings in the chimney, and at the week-end he left her and the rings. When the next driver took possession, he knew nothing about this doctoring that had been performed in the chimney, and when doing his best to help a goods-train up a bank in the dark, he heard something go by his ear with a whiz. He took but little notice of it, as he thought it was an owl dazzled with the furnace light; but he heard the noise again, and then walked forward on the framing, and, looking up, saw that *the piston-rings had come out of the cylinder*, and were clustered together, like the sticks of a rook's nest, on the top of the chimney. He shut off steam, and called the train engine-man, who came over the tender, and he, for a second, could not understand it; but, opening the regulator, and finding the engine did not blow through, he came at once to the right conclusion that somebody had some brains in his head, and knew how to use them. It is at the start that engine-men have to think, not only of what they are doing, but to think very often of what is best to do. Such independent thinking was more in demand many years ago than it is now. A driver had a little engine that was very sluggish, and when he was piloting passenger-trains, he could scarcely keep the coupling tight. He had plenty of steam, and what was he to do to make her run faster? This is what he did, and what alone he could do:—he took out the valve-spindle cotters, and put in a piece of copper at the bottom of the sockets, and then drove down the cotters again. As the obliquity of the connecting-rod affects the motion of the piston throughout the back-stroke, being behind the position which it would occupy for all positions of the crank if the connecting-rod were indefinitely long, the effect of the copper would be to give the engine more "lead" on the back-stroke, and plenty of steam to pull the crank over, and would virtually benefit the distribution of the steam. The volume of steam entering the cylinder would be more equalised at both ends, there would be less pitching and rolling, and therefore less lateral friction to overcome.

The same object is attained by casting the back port longer than the front one, so that, for any given position of the piston in the cylinder, the area of entrance for steam is the same. Some young engine-men are very sharp and shrewd, and it is because they are filled with information, and have not to seek and to buy it when required. Others there are who start with nothing, and they end prematurely. One was piloting a passenger-train up a thirty-mile bank when his engine commenced to slip. When he shut "off" steam, the coupling lifted off the draw-bar hook; when he put on steam again, he did not notice any difference in the working of his engine, because he was "digging" into it, and so the power was expended upon his own engine in gaining speed, for he ran fifteen miles before he found out that he was detached from the train-engine. The ear should be trained to detect, on the foot-plate, the slightest variation in the beat, so that if four carriages out of sixteen were to become detached through a coupling breaking, it would be known on the foot-plate instantly. This power of discrimination is obtained by first-class engine-men, who know exactly how sixteen carriages pull, and how much less coal it takes to pull twelve carriages. After a young driver has been piloting for a time, and the foreman finds he can get on with "old tubs," he is promoted to the position of engine-man on the goods-trains, and takes his place with other men in a link. While he is piloting with any kind of engine, and shunting in the yard, and running all over the line with specials—fish, excursions, minerals, &c.—he is not asked to account for his consumption of fuel, because it is known that his work cannot be defined or worked into figures, and it is charged to general expenses. But as soon as a young driver joins a link of men, and works with a regular engine, then his mettle is tried for the first time. He has to see what he can do—to keep the road, to keep his engine together, to keep out of collisions, to keep off the fine-list, to keep time, and to work with the least possible consumption of fuel. How is he to do this? If he can do this at the beginning, on the goods, he can do it when he climbs up into the higher links. And he should do so. It can only be done by having studied the best models, by having selected the best practice, by having for his guidance the best rules.

Who are the best models, and how shall we know them? They are known by their respect for general order, for their systematical examination, for their tact and skill in handling the shovel, for a thorough acquaintance with the engine anatomically and physiologically, for a thorough knowledge of the generation and principle of application of steam.

The best practice is always to be found in rank and value in proportion to the labour and study a man has given to railway matters in general. It cannot be admitted for a moment that every man must go through what every other man has done, before he is perfect, before he has formed an opinion in his own mind what is good practice.

Sydney Smith beguiled his lazy horse into a quicker pace by fastening a sieve of oats to a pole a little in advance of the creature's nose; but with the iron horse one may rattle the corn and beans in vain, and there is no make-believe in a wisp of clover. Nothing will make a locomotive go like keen insight, which seizes as it were by instinct upon the fundamental principles by which good practice is regulated. There must be a living force, and not a dead letter. The *satisfaction of* the imagination must be made subordinate to the satisfaction of the intellect, for it will not do to imagine we know, and remain in doubt, until we find ourselves confronted by the deepest questions of locomotive life. No. We must seize and analyze—call it scientific reasoning, if you will—the facts which interest us until we can *see* through them. What must have been the forlorn condition of that young driver who told his fireman that he thought the fitters had put the blast-pipe on the wrong way up? or of the individual who, on hearing the engine blow through, books the *valves and the pistons to be examined*, through not being able to distinguish a valve blowing from a piston blowing through? or of another man who attempted to examine the middle clack and scalded himself, when he could feel that the delivery-pipe between it and the top clack was hot with steam and water, but *did not know* the actual facts before his eyes and senses: that the top clack must, to produce such an effect, either be leaking badly or stuck up, and that to interfere with the middle clack under such conditions was highly dangerous? In the instance to which reference is made, it scalded the driver so badly, and affected his nerves so much, that for a time his life was in danger, and after he recovered he refused to have charge again, and sought employment as a platelayer. The list of incidents of this kind might be extended with interest and profit, but where should we stop? From a spark in the lagging of a boiler caused by a neglected ash-pan, to the wreck of an engine and train caused by neglecting *in time* a danger-signal, there are facts enough to fill a volume.

A young driver's work was once marred, as many another's has been, because he could never bring his plans to a focus, or conform them to a general scheme. His prejudices against a *system* mastered him in practice. He had had the best of information given him freely and gratuitously before he was placed upon an engine, but with such a temperament as his was, reasoning, which implies liberation from prejudice, had no fair chance. His mode of working was not the growth of thought, but was founded on likes and dislikes, which had grown up into his mind he scarcely knew how; and his strength—what he possessed—was the outcome of repetition, and not, as it should have been, deliberate examination. His engine was attached to an express, in the place of an engine that had suddenly failed with a burst tube, after having "banked" for four hours. He had proceeded fifty miles out of one hundred and twenty miles when he smelled something warming, which caused him of course to leave the foot-plate and walk on to the engine-framing, when he found the lagging was on fire; that is, the woodwork underneath the sheet-iron casing which is placed round the boiler. He was under obligation to keep good time, and what with the fire and speed, he was not in a comfortable position on a very dark night. He and his fireman endeavoured to put the fire out with buckets of water, and while they were fully occupied endeavouring to do so, they missed the distant-signal of a station, but fortunately sighted the home-signal in time to stop at the station, when the locomotive superintendent, who happened to be there, saw the state they were in. He examined the ash-pan, which he found nearly full of ashes, which of course rolled out and had been struck by the big-end, and carried up into the dilapidated portions of the cleading, so causing the fire. The engine-man was severely censured, and was put back to firing; all this entirely through his not doing what he had every chance and opportunity of performing, and should have performed. This is a full-length portrait of a driver who kicks over his traces by refusing to learn from his authorities, and who cares nothing for any definite system of working.

Little better was the case of driver Pinder, who was running goods, and in a fair way for higher service. He came on duty one night without examining the Special Notice board, which is supplementary to the General Notice board, on which are posted notices to engine-men, intended to be reminders of some duties as binding as those in their rule-books, though the special notices are supposed to be annulled when taken down. A notice was on the board when Pinder came on duty, that the *incessant rain* had swollen a river so much as to have rendered a bridge, over which he would have to cross with his train, dangerous; that until further notice it would be worked as a single line; and that a pilot-man was appointed to pass the train over it after each driver had brought his train to a stand-still. Pinder had neglected to read the special notices, and, therefore, was unaware of his danger until too late. Approaching the bridge at an ordinary speed, he ought first to have seen a red light; whether he did see it or not is uncertain, but as the pilot-man was at the other end of the bridge, he could not warn the driver, who ran with his train right into a gap, and into the river below, and he and his fireman were killed on the spot. Many minor accidents have occurred by neglecting the Notice board—such as running into the work of platelayers who were relaying rails. This mishap occurred to a driver who was young in experience, and who was an extra engine-man, and one in whom his foreman had great confidence. A notice was posted on the board that, at a certain place, all drivers running over that portion of the line, must look out for signals as the surface-men or platelayers were changing the rails. Rowland, the driver, was sent in charge of an excursion-train over this road, and as he neglected the board, he was not aware of the alteration; consequently, he was unprepared to stop, and ran by the out-look man, and went off the road with his engine and three carriages. A very singular notice was once put upon a board respecting a pair of crossing-gates which were attended to in the day by a man, and in the night mostly by his wife. The old man was accidentally run over and killed, and the railway authorities, in consideration of his past duties and unfortunate end, were disposed to allow the widow to mind them in the day, and to have them closed at night, and opened by the drivers. It was a single line and only three trains passed through them between eight P.M. and six A.M. The notice was there for all to read, but about a dozen gates were demolished before all the drivers whom it concerned *really knew* of it.

We have already considered the reason why one driver's ill-success is no caution to another, and it is a great cause for comfort to reflect that the experienced officials of railways have recognised this to be a natural and permanent truth.

Classify the passenger drivers, and you will find sufficient difference to satisfy you that the worst half is composed of men who have had no experience on the goods-trains, and that *unthinking* men do learn alone from their own experience. If a man is promoted from the position of a fireman to that of a passenger driver, he will, as sure as gospel, find out on passenger-trains what it is to choke a fire; to get off the road in "trap" points; to overshoot signals; to find out he has left half a train behind him; to have a dirty, unworkable screw-jack on the tender; to have a worn-out brake screw. These and other such irregularities, which almost all learn from experience to avoid, will become known to him at the expense of many vexatious delays and complaints from passengers. The growing importance of the passenger traffic makes it popular, and therefore only the brightest men, possessing the pure essence of enginemanship, can work it with any chance of success.

For some men, whatever they read even is stamped upon the mind permanently, and some such men read everything—read enough to stock a young head with old experience; but, as already mentioned, our drivers have no books, excepting the experience found upon the foot-plate. True, the foot-plate may be represented as a strong solution of books. But it is long before the scholars can be brought to believe that he who runs may read, and it is years before they find out how to elicit the true significance of everything before their eyes and ears. It is in the "goods" school that they find out, placed there for that purpose. To appeal to experience may mean to appeal to facts classified and arranged, or it may mean to appeal to facts resolved into general truth. A man may think that trains run past signals because they run too fast. Another may say, "I know the engine will not steam with a thick fire." Another may say, "I know, when my engine is blowing off with a full boiler pressure, I do not use near so much water as when the steam is low." There is much truth in all these observations; but it is a fact that hundreds care no farther to pry into the matter.

Some drivers shut off steam when approaching a station half a mile farther off than others, and as the momentum of the train represents so much stored-up energy derived ultimately from the fuel in the fire-box, it is delivered by running the half-mile without steam. A driver, say, makes forty stops a day, and shuts off steam at each station half a mile sooner than he is accustomed to do. He runs twenty miles with the steam "off;" whereas formerly he was burning fuel and wearing brake-blocks and wheels out, in order to stop where the stored-up energy of the train would have taken him, without making a second of difference in time. Again, engines steam with thick fires as well as with thin fires, and even with better economy. Some engine-men, knowing that a thin fire was the safest, worked with thin fires, and their coal consuption was heavy. They were resting on the bare fact. Afterwards they were informed that a thick fire was only a relative term, just as the bursting of a boiler at 30 lbs., and that of another at 140 lbs., would both be caused by over-pressure.

A thick fire is the best of all fires; but it can only be called thick when the blast cannot sniff through it, and draw the air out of the ash-pan into the body of the fire. If nothing else was required but to fill a fire-box with coal and leave it to be consumed, we should have different stages of combustion, and different temperatures. At first, slow combustion, very black and much smoke, due to the supply of air being insufficient; then, in proportion as the necessary draught is obtained, an improved supply of air, though disproportioned to what is required, would increase the velocity of combustion, accompanied with grey smoke and lurid flame. Then would follow, as the blast could draw in a larger volume of air, equalising with the quantity of gas in the furnace requiring such supply, a clear yellow flame, which at times may be seen to wind round and round as it passes through the tubes, whilst no smoke would be visible. Now the control of the air supply depends upon the strength of the blast, or the force with which the exhaust-steam escapes from the orifice of the blast-pipe. If the depth of the fire prevents the exhaust-steam from drawing air through it, in order to produce perfect combustion—as perfection is attained in a locomotive fire-box—then the fire is too deep, even if it be only six inches deep; but if perfect combustion is effected, which is known by an absence of smoke, then with an eighteen-inch fire it is not a bit deeper than necessary. But if a heavy charge be laid upon this fire, when it has burned down to fourteen inches in thickness, so as to raise its depth again to eighteen inches, in all probability it would for a time be too deep, giving off black smoke and checking the steam considerably. As regards the use of high-pressure steam, some drivers work from the start to the finish with a blowing-off pressure, and they do better than other drivers in many respects. They do not use the same quantity of water or of fuel, and they keep better time. The facts are well known. How is it?

The use of high-pressure steam admits of the principle of expansion being carried to a greater extent than with a lower pressure, and cutting off the steam earlier. If an engine-man can cut off one-eighth earlier in the stroke during a run of 150 miles a-day, he may find an unexpectedly large quantity of water left in the tender—and of coal. Some very old experienced engine-men, having in their charge boilers capable of holding steam to 140 lbs. pressure per square inch, do not care to have the steam much above a 100 lbs. pressure, and they work very satisfactorily with the reversing lever, the regulator being wide open. But the result in consumption of fuel and water is considerably higher than in the case of an engine-man who keeps up the full boiler-pressure, and in other respects works with the lever well back to expand the steam, and regulates the speed by means of the regulator.

After an engine-man has been on the goods service for a number of years, and has become well acquainted with engines of various kinds, he begins to look for promotion. This is regulated in many sheds in the order of seniority, but sometimes a bad history keeps a man back; for every time a man figures on the fine-sheet for an offence, it is registered in the books against him for the remainder of his term, and if he lets out a word about promotion, the "history" is produced against him, and he may fare badly, too, if it should read thus :—

Fined, one day's pay for choking a fire, and losing forty-five minutes.

Fined, one pay's pay for hanging a hook upon the safety-valve lever.

Fined, two pounds, for locking the safety-valves of his engine.

Fined, one day's pay, for stopping on the road to clean the tubes.

Fined, one day's pay, for running through a pair of gates.

Fined, one day's pay, for threatening to throw his fireman off the engine.

Fined, one pound, for having a stranger on the engine.

Fined, half-a-crown, for smoke nuisance.

Fined, five shillings, for bringing a pig 150 miles without permission.

Fined, one shilling, for breaking a coupling.

Fined, a day's pay, for running over three horses, and not reporting it.

While an engine-man is on the goods service he is exposed to more temptations than dangers; but unless the guard is a confederate, there is very little chance of thieving. It has happened that two bottles of brandy have been found on the engine, or a lot of fish, or a new pair of boots. Men have been taken-up for having fowl, ducks, and green peas in their baskets. When fowls were missing, they generally "walked off" in couples, as they did of old into the Ark. But, considering the amount of property in transit, and considering the facilities men have for helping themselves, while shunting in a siding to clear the way for passenger-trains, it must be acknowledged that they are, on the whole, a straightforward, honest body of men.

With regard to the dangers attending goods drivers, they, of all railway men, are the safest. Their speed is not very high, and, therefore, if there is anything on the line that they can see, they have ample time to stop before it; but, in the dark, they fare much better than anybody on the main line, because they are timed to keep time, and if they don't, which is often the case, they cannot trip anybody else up. But the *high-fliers* —expresses—come into the tail of their train sometimes with a crash, which may be by the length of from forty to sixty waggons distant from the goods driver, who can afford to jump off his engine, and ask the "flier" what he thinks of doing. "If thou thinks to get first," said one goods driver to an express man, who was engine-deep amongst the débris of a dozen waggons, "thou'st better back out, and thou go round Colwick;" which was a route fifty miles away.

By the time a driver has served five or seven years on the goods trains, there is, or should be, very little to be in ignorance of, for in that time he will have had every opportunity of knowing *all* that is to be known about an engine—firing, driving, and the general management of it, for there has been a multitude of chances.

Promotion from the goods-trains to the passenger-trains is very welcome, for it is a deliverance from long hours, and from the anxious duty of keeping clear of fast trains, and from the cold and poisonous damp air of night. Calamities may follow, for he will not be clear of them; but, having been taught in a good Spartan school, by hard lessons and a rough life, he will be able to grapple with them. If he has divorced himself from the idea that there is such a thing as chance upon a railway, he will not slacken for fear, nor be struck by colour-blindness through looking to see if a fire is burning rightly; nor will there be a silent terror in the mind to whisper of hidden dangers. No! He will run along like flame, and will handle the regulator with an arm whose inspiration is experience. The recollection of the past has taught him that everything is consequent, and nothing comes by a chance. Neglecting to look after a little steel pin—a trivial thing, some may be inclined to think—and yonder magnificent iron steed, champing and foaming under steam, is imminently liable to an accident, that will *reveal the* character of the driver. Neglect the working of a trimming—but a few strands of worsted, some may think—and the steel-crank journal will grip an axle-box, and wrench it out of the framing. Neglect yonder small red light, and the engine, with a train, is wrecked. Neglect the undeviating plan of nature in combustion, and the fire is choked. Neglect small things, and doubt their power, and the engine will be stopped, even by a grain of sand in the packing, by one strand of worsted too many, by a shovelful of coal too much, by the flaw in a leaf of a spring, by a false stroke of the pump, by a slip of the wheel, by a loose cotter, for the want of one spot of oil, one glance at the gauge-glass, heedlessness of a single notice. Look! Here is an engine from which the fire has been withdrawn. For what cause, do you think? May be, because her boiler leaks. No. Is it because her wheels are worn out? No, nothing so bad; it is because her driver considered not the things that, trifling in themselves, were capable of damaging an engine, so that it had to be fetched off the road. Nothing is broken even; but a valve-spindle is bent through the friction of the gland, which heated the spindle, and caused it to double up. In all probability, half a turn of a nut, half a glance, would have saved that engine.

On the slow passenger-trains a driver has a very fair berth; his engine is prepared for him, cleaned, and lighted up, and he is in charge to run from station to station; he is, in fact, in training for higher speed, for longer runs without a stop, to be performed day after day. Each feature of passenger working is stamped upon his mind, and he finds that with passenger-trains there is much to be learned to keep time, and to steer clear of danger. It is not so much knowledge of engines that he is supposed to possess, as a knowledge of the running at a higher speed of more important trains.

By raising a man step by step, an estimate of his character may be formed. It is not every man who can run even slow passenger-trains, and many have returned after a trial to the working of goods-trains. Some men are like a machine wound up, and act like a spindle or a wheel. There are slaves to one subsidiary operation, and some such characters have gone about whining after their old place on the goods-trains, steady, slow, and sure.

> **"My eyes are dim with childish tears,**
> **My heart is idly stirred;**
> **For the same sound is in my ears**
> **Which in those days I heard."**

Their sympathies are with the old-fashioned pace, and they see more attractions in a box-waggon than in forty saloon-carriages; and thirty-five and the brake to stop at Worms to set down a bag of bone-dust, is better far to them than the "limited" nine to stop at Gold and set down his Grace the Duke. The duties on the passenger-trains partake more of an intellectual element, as the service is subject to the caprice of accidents. From the slenderest hint, it is possible instinctively to form an opinion, which may determine one to act in the most important crisis. A driver feels more, on a passenger-train engine in five months, that the power to act on the spur of the moment is the excellence of driving, than he would in five years on the goods-trains. The promptitude with which a man can take a hint and act upon it, is a test of the degree in which he possesses the essential qualities of a man to be placed in charge of a thorough "goer," with a cylinder of 26-inch stroke, driving-wheel 8-feet diameter, and speed sixty miles an hour. An illustration of this principle is given in the character of Standiford in "Locomotive Engine Driving." He was looking out *for* a signal, but instantly he was called upon to *give* a signal and warn an engine-man of danger, who he thought was not far away waiting to give him one. Nowhere is it easier to observe the mode in which accidents come about than upon a railway. Driver A takes driver B to be clear, and he collides with him; then driver C runs into both, because the signals are set for him *to do so.* Driver D sees the distant signal of a station off, and does not see *if* it should be off, and runs into some horse-boxes at the station, killing two valuable horses worth 200 guineas each. What! all through *not giving a* glance to see if the signal *should* be off? Yes, Driver E, while putting in a gauge-glass, missed the distant signal of a station and killed three waggon horses. The gauge-glass could have been put in at *any time*, and the driver had no more business with a gauge-glass in his *mind* on approaching a junction than he had with a whiskey-bottle to his mouth. Driver F, while attending a "tin-pot" kind of fire, which always required either a rake or a splice in it, ran by a look-out-man, and went off the rails where some men were relaying the lines. Railway service demands men who can read a thousand volumes in signal accidents. The greater portion of accidents are caused by engine-men not obeying signals.

On the fast passenger-trains, a driver's good name and fame depend upon three things, viz., a thorough good fire well burned through before starting, a thorough good examination of his engine before joining a train, a thorough and constant look-out for signals.

The peculiar character of express working is favourable to observation. The driver keeps the same engine for years, and gets acquainted with all its peculiarities, and therefore he can manage that engine—his own—better than another. He runs the same trains, and past the same signals; he uses pretty regularly the same class of coal, so that he can catch with a quick eye the slightest deviation from the common current of events. All these things create a sense of fitness and strength for his post; he is swift in proportion to his knowledge of the road and its varying gradients. There can be nothing shadowy in the recollection of it; all misgivings are rolled away; and in the struggle to keep time, to give public satisfaction, to injure no one, he knows to an inch and to an instant where and when to stop. Discord and confusion underly all railway working, but the rightly-prepared mind and eye can steer through the vague mass of points, and traps, and gullets, and signals, and tunnels.

But these Philistines of high speed that come and go in our day are more fortunate than the earlier drivers, who had to stand upon foot-plates with no weather-board to protect them, and no block-system to keep them from jostling together. There were scarcely any tail-lights to the trains, and signals were not easily seen, being fixed up by side of a wood, or where the drivers had to stop very nearly to find them. So far as the speed of engines is concerned, we have not been able to improve upon them much. We ran sixty miles an hour thirty years ago, and that speed is seldom exceeded even now with all our accumulated experience. But speed is now maintained under more favourable conditions, and for longer distances.

We have the finest locomotives in the world; and for comfort far before anything that old engine-men in their firing days could have dreamed of. The outline may be somewhat the same as of old, but the details of our present engines have been wrought out with consummate skill. We remember having to oil some of the old grandfathers of the present engines; and a fine job it was. It required a special oil-can and a torch lamp; and, to oil the big-ends and excentrics, a fellow had to screw his head and body into an incalculably small compass, and screw out again with a black patch of grease on a clean slop. A good deal of tallow was used in big-ends, and the axle-boxes were made so that you could *not* get at the trimmings.

New ideas have come to the front with new men, and there is more of art and less of tinkering to be seen, so that the locomotive has become a mechanical achievement of the highest order.

On all the great railway systems, the object sought is to get over more ground in less time, which is partially attained by taking "stops" off, and running through-trains, and by hooking to those trains engines capable of maintaining the speed under the direction of highly experienced drivers. The first improvement towards quick travelling was achieved by laying down a trough between the rails, from which the drivers could pick up water whilst running—an idea of great value, brought out by the eminent locomotive engineer, Mr. Rams*bottom.*

The water is pumped from a well into the troughs by a small steam-engine fixed by the side of the railway. As soon as the engine is over the trough, a scoop is lowered by the fireman into the water, by means of a lever worked from the foot-plate. The scoop being dipped into the water, which is of course stationary, the speed of the engine onwards causes the water to run up the scoop into the tender, which is very soon filled up; after which the fireman raises the scoop out of the water. Occasionally, this process has not been unattended by some irregularity, followed by no trifling amount of discomfort to the men.

On one occasion, as the fireman attempted to shut off the water, he found it was impossible to do so completely, and therefore the water continued to rise; and before the engine reached the end of the trough all the coal had been washed out of the tender, together with the shovel. It was dark at the time, and the fire-door was opened to give the fireman a light on to the tank-lid, so that he could see when the tender was full; and as he could not raise the scoop, the water came over instantly and washed the coals direct into the fire-box, filling it over the brick arch. The train was the "limited" mail, and therefore the men were determined to make the best of it. They had one thing in their favour, and that was a boiler full of water, and a favourable gradient before them for thirty miles. The shovel having gone, the fireman scraped the coal away from the door with his hands, and every effort had to be made to bring round the fire, which was nearly extinguished. They succeeded in reaching their first stopping place with only a few minutes' delay. They borrowed a shovel and trimmed the fire up, and before they arrived at their destination they had recovered the lost time. The same express-men, a few nights after this, had another adventure, which exemplifies the kind of experience which men acquire on fast trains.

They were proceeding down a bank of considerable length at about 3 A.M. in summer with the "Scotchman." The light was what is known as "grey" in the morning, and the sun was breaking through the mist. As the fireman lifted his head, after putting an injector "off," he saw something on the line in front of the engine; there was no time scarcely between seeing it and being over it, but steam was shut off, and the driver and fireman looked back, but could see nothing, and so they proceeded. But, at first, they thought of stopping; and why they did not stop is the moral to be learned from this incident. Some five miles back from where they saw this thing, there were several goods-trains shunted into a siding, intended to follow the express down the bank. They did follow quickly, and if the express had stopped so soon after passing them they would, in all probability, have been unprepared to stop within any reasonable distance. In such a light, they may not have seen a signal to stop at all, and a serious collision might have happened; such was the opinion of those who understood those matters. Therefore, in working expresses, the engines will go with plenty of steam almost themselves, but it requires a thorough knowledge of railway life to conduct a fast train, to appreciate facts, and to act upon them instantly.

The express-men had not long decided to go on before they noticed the steam going down. "What do *you* think it was, mate?" asked the driver.—"Well," answered the fireman, "I had no time much, but I thought it was a man under a horse-cloth."—"Then," replied the driver, "he is in the ash-pan." The driver went on to the framing, and between the driving-wheel splasher and the boiler he could see something like the tail-end of a man's coat; and then he again thought of stopping. But the apprehension of the goods-trains following determined him to go on, for he knew if the man was in the ash-pan he was dead already; and so he went on to the next stopping-place, where he found part of a man in the ash-pan. The other part was found where the engine first ran over him.

It is sometimes very difficult to know what to do with an express. If a man stops, persuaded in his own mind he is justified in doing so, and if he should prove to be wrong, find *nothing* the matter, and it should turn out to have been a hare scampering across the ballast in front of his engine, he will get cautioned.

An express-man was keeping time one very dark rough night, and while the fireman was firing he thought he heard the stones on the line rattle; and he said to his fireman, "There is Tommy Tickler's hare;" which was understood to refer to the case of driver Tickler stopping, and finding nothing the matter with his train; and the alarm was attributed to a hare running *alongside* of him, as Tommy would insist that he had heard a terrible rushing amongst the stones for some distance. The fireman of the express, some time afterwards, went on to the framing to do some oiling, and, having done one side of the engine, he was going round the front of the engine when it was running at sixty miles an hour, and he found he could not get round, for a horse was on the bogie. "A horse on the bogie" sounds like bush slang, and therefore I beg to explain that the bogie of an engine is the piece of framework running on four wheels in front of an engine. The fireman turned round as quickly as he could in a gale of wind with the lantern in his mouth, one hand holding his cap on, and with the other holding on to the hand-rail, and regaining the side of the foot-plate, shouted to the driver to stop. "There's a horse on the engine." The driver thought he was chaffing, and for the moment hesitated to shut off steam. He took the lamp and looked for himself, because it was such an extraordinary announcement. They were approaching a station, and the passengers were not a little surprised to find such an express pulling up there. It was thought somebody belonging to the squire's household was going to honour them, but they were more surprised on seeing the engine come under the gaslight with a load of dog's-meat for their village. There were two horses on the line, and the one killed must have been rearing when the engine struck him; and it occurred when the driver heard "Tommy Tickler's hare." In America, they have cow-catchers in front of the engines; in England, we are contented to knock them out of the engine-track. But we have very good fences by the side of our railways, and it is very rarely that an engine or a train is de-railed by running over cattle. It happens now and again that a driver has to report that he came up with cattle on the line; but they get upon the railway when crossing-gates are left open, or when they are driven across the line from one field to another. A case of this kind occurred by which a horse uncoupled the engine from the train. The driver of the train, approaching the crossing-gates, could not see that they were open to the fields on each side of the line; and just before he passed them, three horses left the field, and ran on to the line. One of them was struck by the engine which ran over him, but his flesh and bone managed to lift the engine-coupling off the hook of the van next to the tender. When the driver put on steam, he ran away from his train; but, finding his engine lightly loaded, he looked back, and saw the train was not attached to the engine. Locomotive life has both its ugly side and its pleasant side; but never a driver complains unless he happens to run over a dog, and then we hear a driver say he would rather have given five pounds than have killed him.

We have, in this chapter, endeavoured to give a few incidents in the rise and progress of engine-men; and we may say, in passing, that Englishmen are proud of their pluck, and the fearlessness with which they perform their work. We hope in some of the following chapters to show that the fervour of enthusiasm is well grounded.

CHAPTER V.

THE ENGINE-DRIVER—FOOT-PLATE EDUCATION.

THE engine-man must abide by the fact that he is a scholar always. And just so much as there is of the docile spirit within a man, so will he be alarmed at nothing, and nothing will happen but that he will see in it some fresh information which will assist in preventing him from jumping at a conclusion inconsistent with the facts.

A driver who prided himself on the advanced state of his locomotive knowledge, in theory and in practice, had a great fall. Unmistakably he was well informed as a locomotive-driver, and he had read many works—standard works—dealing with locomotive questions, such as "Railway Machinery," by the eminent author, Mr. D. K. Clark. His library was by no means a contracted one; but he forgot, or rather did not know, that foot-plate experience is positively unlimited; and, consequently, he foolishly bragged in the presence of other drivers that an engine could not fail without his being able by his experience to find the cause of failure in a few minutes. It came about in this way. He applied to a locomotive foreman for a berth, with good testimonials for industry; but, having run past some danger-signals, his last superintendent was obliged to discharge him. He was promised a place if his testimonials turned out to be genuine; and they did. Meanwhile, during the time the correspondence with different companies was going on respecting this driver, he associated with the drivers of the place, and joined them in the evenings over a social glass, for his presence was rather acceptable, being known by repute to be a leading driver. By chance, at one of these evening parties, the subject of the fine-sheets came up. One driver had been fined for telegraphing home for the tool-van when an excentric sheave had shifted; for, as it afterwards turned out, he had wired "crank-axle broken."

There was, to be sure, some chaff about the matter, of a simple, harmless kind; and such chaff is, joking aside, salutary. A man who breaks down goes under the disabled engine with his wits alert, not so much for fear of being fined. Oh dear no! but he wants to hit on the flaw: the deviation from what is right, in order to avoid the chaff he would get from his mates, should he make a mistake of a ludicrous kind. All right-minded drivers are very cautious about jeering about little mistakes made by their mates on the spur of the moment, because they know full well that no man knows all the keys to locomotive accidents. He may have worked at the bench, fitting up engines, and worked as an apprentice with the shovel, and had charge of the fastest trains in the world, and even then he may fail for a time to find out the cause of an engine not steaming properly, or to find out why one driver can work an engine which no other driver can work satisfactorily. The driver who had been promised a job failed to control his tongue, and thought that a man who could not tell whether the crank-shaft was broken or an excentric-sheave had shifted was a duffer. No doubt it was injudicious of him in strange waters to foretell the depth, and he found it out so. No human being knows, if he begins to swagger, how soon he may weep.

This boastful driver had been employed for some time when his fall came. An individual, fiendlike, dogged him until the opportunity came to make the fall as great and as complete as could ever have been imagined.

As time moved on, Cophit, for that was his name, rose rapidly in the estimation of the foreman, far more than he did in that of his mates; and as it ever was, and ever will be, promotion followed. The man was civil, the man was obliging, he would go out with a train whenever his master required him, under all the variety of circumstances very familiar to drivers. Now and again, a foreman finds himself in a fix for a man owing to several being off ill, and when more men are on the sick-list than there are spare engine-men, it must follow that extra work will fall upon those who can work, and therefore it is no uncommon thing, under such circumstances, to ask a driver to go straight home and get two or three hours' rest and then come to work again. It may be said that the man would not be fit for the extra duty. Fit or not fit, many a driver has worked seventeen hours, then off three hours, and on again for a short trip of ten hours. More of this kind of thing used to be done than what is allowed nowadays. These are the very best days for engine-men; improvements are being made in the engines, as well as in the hours on duty; and where no change has yet been made, we may be sure a change will come. Tom Cophit was a chap who never grumbled under the grinding wheels of locomotive life. He bore all like a fine piece of well-tempered steel, he would bend without breaking; and he could do this both in winter and in summer, amidst thunder and darkness, with any old tub of an engine that the foreman *had* to give him, and therefore no wonder was it that Cophit soon gave up goods driving for passenger work, and less wonder was it that he was, with all this good-nature, boastful.

Here lies a secret. This man's nature knew no difficulties in the way of duty, and therefore he met with none. Consequently, that gave him an inward consciousness that, happen what would to his engine, he should be able to cope with it. At the hour appointed, he arrived on duty, and looking at the direction-board to see where his engine was, he joined her in No. 4 Michael's shed.

As usual he found his engine in steam, his fireman already arrived, the foot-plate swept up, and the boiler-front cleaned properly; for he was an engine-man who endeavoured to bring up a fireman in the right way.

Tom examined the water in the boiler, looked to see what steam there was, and what fire there was in the fire-box; after which, he left the foot-plate with a few spanners to examine his engine thoroughly. This important duty is seldom performed systematically, but is done in many instances in a slip-shod fashion ; that is, the driver goes underneath, shakes a big-end, perhaps two, and out again as soon he comes from underneath. He meets Bill Blunt, and they hold a conversation about Polly Perkins, or some other Polly, until train time is so near that there is no time to examine the springs, or see whether the tender-coupling is duly attached, and when the porter comes to hook the engine on to the train, the coupling is missing, and the fireman is dispatched off to the shed for one. He soon finds one and picks it up. There is no fuss about it until they have got twenty miles away from home, and then they find it is out of order, and every time the train is stopped it lifts off the hook. Now such work would not do for Cophit; he examined everything, and, after doing so, he touched the whistle and left the shed for the train to which he was duly attached.

Everything appeared very much the same about the engine and tender, the latter being nice and warm through the steam being blown back into it out of the boiler, instead of allowing the steam to waste "off" from the safety-valve. After the signal to start was given, Cophit opened the regulator gently and got away in fine style, without priming, without slipping, but smartly; which none can accomplish but those who have studied all the points.

A change soon comes over both driver and fireman, for the engine refuses to steam. Now is the time for the display of good enginemanship,—ah! and good firemanship. Directly after leaving the terminus, things looked very jolly and pleasant. She steamed along in all the majesty of power and speed, and Cophit could under such circumstances feel as only engine-men can feel who find things going right with them on important trains.

His dream was short, for now the steam is going down to an uncomfortably low figure. The fireman first tried his hand in manipulating the fire, gently raising it in case it should have *burned hollow,* or in case it should have caked together, and thus prevented the air coming into the fire out of the ash-pan; but with the most careful attention, the engine refused to make steam. It became time to do something, and now it was the driver's turn to do, and to know the why and wherefore of this irregularity. He examined the fire; it was exactly to his mind, the coals were well piled up all round and against the walls of the box; no fire could look better, nothing could beat it; but things looked as though Cophit was going to be beaten, for they looked very much like coming to a full stop.

He nipped on to the running-plate, and, looking between the splasher and the lagging, he could see the damper was open right enough; he passed on to the front of the engine, and found the smoke-box door right and tight, nothing could be tighter. What was up with the old beauty? The fire-box was water-tight and the tubes dry, no sign of a leak anywhere. Yet was she going to stick for want of steam. He dreaded it, because he knew of all men *he* should go on, being a young hand, promoted over the heads of others because of his good temper and brightness. He found it would be absolutely necessary to stop and save burning the boiler, and therefore he made arrangements to stop at the next station, where a pilot engine was kept, and for the first time in his railway life he shut off steam to stop where he should not have stopped. It was a trial indeed, the severity of which no man can measure but those who have run for years and been placed in a like position. Never mind, Cophit, you saved the boiler, and that is the chief point; and however painful it is to stick for steam, it can all be got over; but to burn a fire-box, burns your name into the locomotive superintendent's black-book, and there you are jacked up for ever. There is nothing like stopping in time, if you find you *must;* but to keep on driving and driving until the water is out of sight, and until the lead plug is expected every minute to blow out, is foolhardiness. Stop in time—at anything if you will.

After the train pulled up, the passengers put their heads out of the windows on both sides of the carriages. "Signal against us, I suppose," said one.—"No it's not," said another, who knew something about signals.—"I don't see anything in our way," said a third party, who looked rather anxious.—"I hope," said a fourth man, "there is no fear of another train running into us, and make what railway folks call a telescopic pitch *in*, because that is such a dreadful thing, and will pitch us *out* altogether, body and baggage."—"I am prepared," said a fifth, "for I have an insurance ticket, and a little 'brass' for a nasty black eye, so long as the skin was not cut, I should not mind a bit." A sixth party was shouting at the driver.—"Hi! driver, what is all this about? What are you stopping for? I want to catch another train at London going North. Come, go along."

The driver could not attend to such questions, for he was engaged upon one of the greatest problems he ever had in his life. He no sooner stopped than he found the "pilot" was away, which was unfortunate—very. He examined his engine everywhere. He was beaten, and the time had come for him to try and make a silk purse out of a sow's ear; but he shakes too much. The oppressive weight of circumstances casts him down and crushes him. The light smoke rolled from the top of the engine chimney and was being driven by the breeze over the neighbouring fields, where the shepherd, from the motion of the clouds, foretells a storm, and is driving his flock to cover, whilst the driver stands gazing into wheels which he would rather have seen drop off their axles than stand still as they did. Where is the boast and glorious vaunt, now? Now is the time to shine, to find out what the deviation is, what the prior something right was. He cannot. "Wire," said Cophit, speaking to the telegraph boy, "to Paradise, and say they must send another engine to take the train on."—"From whom?" asked the boy.—"From the driver," answered Cophit.—"Ah, that won't do," said the boy, "you must give your name; it's my orders to send all telegrams in the sender's name."—"Tom Cophit, then," he replied. Meanwhile the guard had done his best to assure the passengers that there was not much amiss. One passenger wanted to know if the "iron *horse*" *had* come out without his breakfast, and had stopped because of an empty stomach. Another wanted to know if it was a locomotive or a traffic affair. Some one wanted to know if the driver had come as far as he knew the road. The passengers were all good-tempered, and being at a station with a refreshment bar, it helped to keep them so. They promenaded and did the platform, and people got into conversation with each other, and narrated their little railway adventures. Some had been in worse circumstances. "In fact, instead of stopping," said one traveller, "I was once in a train which the driver could not stop, and we went right into the stop-buffers, which changed their appearance and our position in the train at the same time." Another could narrate how he was so unfortunate as to be in an accident in which one train overtook another, and it was a singular thing that no one was seriously hurt, bodily. But about a score of people lost their watches, how and when they never could find out. Of course they had some idea how it was done. As soon as the collision happened, which was in the dark, everybody was anxious to leave his seat, and as soon as some of the passengers had done so others felt inclined to do the same, and no doubt a gang of thieves, whose wits were equal to the occasion, saw at once the chance of "nicking" watches; they at once offered to assist the ladies and gentlemen out of the carriages on to the embankment, and were at the same time polite and "relieving" of watches. It is not the only instance in which light-fingered spirits have improved the occasion of a collision by carrying off portmanteaus, hat-boxes, and jewel-boxes. In fact, on one occasion some one carried off a baby. An engine coming up, the conversation was changed; and in a few minutes the train was on its way to its destination, where it arrived safely, after a delay of one and a half hours.

An inspector was sent with the engine which took the train on, and the nature of the failure was made a subject of instant inquiry. Cophit stated he was short of steam. "Are the tubes leaking?" asked the official. "No," replied the driver; "the tubes and fire-box are quite water-tight."—"Choked fire, perhaps?" suggested the inspector. "Your mate may have put too much on, and starting away before it was well burned through, you would be short of steam."—" Look here, sir; the engine has been standing still over an hour, and she has not made a pound of steam, and that is a point which puzzles me. I fully understand what you mean by a choked fire; but the steam began to go down after my mate had fired a few rounds. I never witnessed anything like it in all my born days; but what caps me is that she won't make steam standing still and the blower on."—"But," said the inspector, "we shall have to find it out. You appear to have given the matter up; but it will never do to say you hooked 'off' a train, and could not explain the real cause. Being short of steam is an effect. The cause lies somewhere within 4 feet 8½ inches, so we have not got far to seek for it. It is quite clear the cause is in the boiler, and not in the steam-pipes or engine. If you could generate steam after you had stopped, it would be feasible to suppose that the steam-pipe had collapsed, or that the regulator was out of order. I knew a case in which a first-class engine-man stopped for steam, just as you have done, who, unlike you, however, could make steam with the regulator closed. The stoppage was caused by a gland-packer putting the regulator-handle on the wrong square of the spindle; and, therefore, the regulator would not open sufficiently to admit steam to the cylinder in quantities to keep time and act upon the blast. But this case is different, or when an inside steam-chest cover joint is blowing that will fill the smoke-box with steam, so that the escape steam from the blast-pipe cannot form a partial vacuum; and if the smoke-box door draws air, that will prevent an engine steaming properly; because, instead of the air coming through the fire out of the ash-pan to fill the vacuum made in the smoke-box, it enters the smoke-box through the space in the door, which does not fit close to the smoke-box front plate.

"This is a case out of the common; but it is to be explained. Some one has served you a trick, and whoever has done it deserves to be severely dealt with on account of the inconvenience which the public have suffered from it. Don't you think the water in the gauge-glass looks queer?"—"That," answered Cophit, "is because the boiler is inclined to be dirty; it is rather chalky to-day."—"Is it not uncommonly chalky?" asked the inspector, and, turning round to the fireman, he ordered him to fetch a bucket of water out of the tender. This was instantly done; and when it was brought to the foot-plate, as the inspector expected, it was a bucket-full of soap-suds. "There," said the official; "what do you call that? Not feed-water—it's lather, and somebody has shaved you as clean as a driver was ever shaved in his life."

Somebody had put some soft-soap in the tender, and the water in it being hot, the soap was gradually dissolved and gradually introduced into the boiler, and the grease covering the tubes and heating surface, it, together with suds, prevented the transmission of heat to the water. "I have," said Cophit, "not the slightest idea who would know that soft-soap would have the effect."—"Just so," answered the inspector; "but the facts are against you, because you have an illustration before you; some one knows."—"Oh, yes; some one seems to know, and has no doubt 'sold me a dog' for once; but they will have all their time cut out to sell me another. I know as much about an engine as most men. I am never afraid of men who were never off their own metals."—"But," replied the inspector, "if you talk like that, the engine-men who have been raised—born, so to speak—upon this line, will not like it, and the advantage to be gained will be very questionable indeed. Now, don't presume for a moment that you know all about a locomotive, or the work about a locomotive. I can say faithfully for myself I do not. I know very little, not half so much as I would like to know, and if you boast of your advantages, depend upon it you will find fresh illustrations. This is bad enough.

"Locomotive engines are in all cases governed by the same laws. They may differ widely in many ways without affecting the engine-man, but don't challenge any man. I will admit you are as learned in locomotive matters as any of your mates, but be a scholar, always a scholar, and then others, thinking you know nothing, or next to nothing, will tell things that you have known and forgotten years ago. But, nevertheless, listen to them. You lose nothing; but at the end of every year—say, on your birthday—you will find people have left a balance of knowledge in your favour, without even having been asked for it. I have never believed for one moment—never believed that any one man knows three-fourths of the facts about locomotive working. Let me ask you how it is when a single engine slips wheels at high speed no steam comes from the chimney, although the regulator is open to admit steam to the cylinder?"

Cophit gave the inspector a glance from under his bushy eyebrows, and laid his grimy hand on the regulator. The other hand he placed on his hip, knuckles downwards. He was rather desponding, and appeared to have no disposition to weigh facts against his experience. This conversation was going on during the time the driver and inspector were waiting for another engine to fetch them home.

The question was so new to Cophit, that he was not prepared with an answer. He knew very well when an engine slips her wheels in the dark or in a tunnel, the top of the funnel becomes dull, but it never occurred to him that such was caused for want of blast, for the want of steam to pull the fire up the tubes and into the chimney, to light up the chimney-top, and to show the top of the tunnel. When an engine slips her wheels, and being at the same time notched up, the travel of the valve is at its minimum; the speed of the pistons, and, therefore, the motion of the valves, is so high, that the steam has not time to enter the cylinder; and it is owing to this circumstance that an engine knocks at the big-end in slipping, because there is no steam to cushion the piston. In fact, the order of things is for a moment reversed; for instead of the piston urging the crank, the crank, by the momentum given it by the steam when the wheel lost its bite, is dragging the piston, and the knock which is heard is the play between the slide-blocks and the slide-bars. When the piston is working the crank, the pressure against the slide-bar is either against the top or the bottom bar. If the engine is running funnel first, it is against the top bar; if the engine is running tender first, the pressure is upon the bottom bar. Nothing of this kind occurs when the crank is, by the momentum of the revolving masses of the wheels, &c., dragging the piston. The crank carries the weight of the connecting-rod, and the slide-block moves freely; and, if there is the smallest possible play, the block will chatter by the big-end lifting and dropping the connecting-rod.

Some people have thought this knocking due to the piston striking the cylinder cover, which would require in many instances an increased length of connecting-rod and piston-rod, assuming the crosshead cotter to be fast, by ¼ or ⅜ of an inch. What must yield to give this required length? Nothing would yield without breaking. But some engines have knocked the cylinder-end out when slipping. True, through the eye in the end of the piston-rod giving way. The engine arrived for the "soapy" one, and in a few minutes they were "off." There is nothing so annoying to a locomotive driver as having to be fetched home, no matter what the circumstances may be. He may not be to blame directly, but he knows an engine was made *not* to break down; and if she does and he can't help it, he feels mortally ashamed of her and himself.

Not one engine out of a thousand breaks down on the road, if it is properly looked after when it is under the charge of the running-shed foreman. He can so arrange a system of examination, that he himself can tell to a trifle when a crank-axle will break, and when the tubes will begin to collapse.

The wheels of Cophit's engine had no sooner stopped over the engine-pit at the shed, than all hands were anxious to know the circumstances of the failure. Some, of course, had mastered them before the driver had. The first on the scene was a bar-boy. "Cophit," said he, "tha'lt come yom a good bit before midnight; thou must have come over the fields." Cophit was too conscious of the lad's innocent meaning to notice *him*.

"What up wi' thee?" shouted a coal-man from off the coal-stage.

Cophit took very little notice. "By Gom," said another coalman, "I dunnot know as I ever seed any one so much tuk to as Tom is. Wheer did he stick? Theer be a bit of paper flying, I'll lay a big bet on this. Wait a bit."—"What's Cophit see?" asked a labourer. "He does not say nowt about her; but seen summat, I'll be bound, to skurry home again."

A wash-out plug was drawn, and the suds caused no little excitement. One interested individual asked his mate, "As't thou ever seen owt like it?" and the cud of tobacco being shunted on one side of the main entrance, he replied, "Now't, now't." Presently they drop away. "I dunnot see as there's owt i' looking at her." In this way the shed hands explained themselves over poor Tom, who was beaten. With some difficulty he kept the lump out of his throat, while he made out a report, which he was bound to do before he went home, and which he did after explaining everything to his foreman. But when he arrived at home, the lump prevented him from eating anything.

"Eat your dinner, man," said his missus, "and don't bother about your engine." He had not told her all. She had caught the word engine, that was all. "It's engine in the morning, engine at night, and if you ever come home in the middle of the day, instead of talking about taking the children out, it's engine, engine, engine. I wonder you don't bring the engine home with you, and stop at home. You have filled the walls of the house with engines, why not fill the yard with them? I wish you would. I rather you would, I tell you, than be always drumming about those beastly engines."

This cut Tom to the quick, for his was a sensitive nature, and the heart was full, ready to burst. She saw it and trembled, for, when she told him to bring the engine home with him and stop at home, he made answer, "Maybe I shall stop at home without the engine," and as quick as thought she reckoned up which would suit best for *all*—Tom and engines, or Tom without engines. Ah! Tom Cophit was already in the presence of Mrs. Cophit without an engine—for he went home *suspen*ded until his case had been investigated.

In domestic circles, how often do we hear and see unkind words like these fall like red-hot shot; and, by heaven! fall on all with equal woe. The sharp dividing axe of venomous words between husband and wife is like the cleaving of a heart. One half will flutter here and one half there. Cophit felt severely the deadly bitterness of his position. He wanted to tell his wife he was suspended; but the domestic storm that had just passed over his hearth made it utterly impossible. What should he do? It was the first time in his life he had been suspended. He could have borne that; but his wife's words! Ah! they had the force of fire. What he felt, no words could express. He sought for some retreat where he could give vent to his feelings. "I am going out," said Tom. "Yes, I suppose so; I'd go and stop out if I was you." Cophit stood in the doorway, watching the road-sweeper, intensely grieved; he felt like one who, landed in his sleep on an alien shore, awakes with dim surprise, feeling that nought can be as heretofore, and he knew not what path to take. There was one path he had often taken before, but he knew also it was the path which had led up to all his unhappiness, and had shut out all hope. It was the path to the inn, where he had said too much which had raised the cloud that now enshrouded him. It had hidden the future from his view and made his pathway dark, and the intensity of the mental struggle which accompanied these sober thoughts caused him to realise sharply the actual state of things. Woes heaped on woes, suspension, and the unhappiness which existed for the lack of friendship which should know no cold medium, which should burn with one love, with one interest and passion.

Subdued tones agitated his bosom, his mind was distracted, and his heart was confused and nearly broken. How often are such workings of Providence destined for good!

He worked himself into a desperate mood, and his blood was burning in the veins of his forehead. "What an accursed fool I have been!" muttered Cophit, in a tone which any one could understand. "Tell me, do tell me, there's a good man." —"Oh, do leave me alone," replied Cophit, "for a little while. I am stung, the cloud which is sweeping across my path just now is the darkest I have ever experienced." He felt the suspension, and the unfortunate barrier which had prevented him from telling his wife. Was it possible to see between the lines the hand of a refiner burning the dross out of him? Traces of such ordeals are not infrequent, for few of us can deny having passed through the fiery furnace, whence we have come out again with strength almost startling.

For the first time in his life he felt that the sunshine had been withdrawn, or he had been removed into a darker phase of life. There was no longer the self-conceit of a proud boastful heart. His way was hidden, his humanity was humbled until his humility softened into submission. Questions fierce and subtle beat in upon him until there was nothing left before him but a vaulted future looking out upon a limitless horizon, with but a sightless blue above. Mrs. Cophit could no longer regard the scene with indifference, and seeing a big scorching tear in Tom's eye she made towards him. "Tell me, do tell me, there's a dear, what has happened? I am very sorry if I said anything, dear."—"You flew into a passion, Polly," answered Tom, "before there was any cause for it. What if I do love engines; you know I love you first and engines after; and, oh, Polly! don't, don't be cross just now. I have trouble enough, I have, I have."—"Oh, Tom! I don't like to see those tears, my darling," said Polly, and she kissed the weeping eye as only a woman can, and the fountain of grief gushed forth. "Polly, oh, Polly! my dear, I, I am suspended. What shall I do, dear?" answered the sobbing man. "Do!" said Polly, dashing aside the tear; "why, do as we have done before, my dear. I will take in work again; you know, Tom, you refused to allow me to work, and I could get all my old customers again. It was only last week Mrs. Hibberts asked me to make a dress for her, and I was obliged to refuse her, because you went on at me so about my working. My darling, we shall not want. I don't like to see those tears, Tom. What are you suspended for? What have *you* done to be *stopped*? Never mind. It hurts me to see you like this. It will all come right in the end. Don't, don't, there's a dear, will you?"

But Tom's heart was broken, and the flood of tears could not be restrained, for his bosom was convulsed with grief. "Oh, Polly!" said he, "it is more than I can bear; I could suffer suspension, but then you were so cross and cruel with me when I came home, you did not give me time to open my heart to you, but you added to my pain by going on as you did about my bringing the engine home with me."—"Look here, Tom, forgive me, do, there's a dear; I will never say another unkind word to you," and Polly meant what she said. Tom could not help but feel so, for her soothing love had dispelled the ominous cloud, and he began to feel that in adversity there is no being so majestic as a loving woman, and without restraint he poured out all his grief upon her shoulder. "Do kiss me, Tom, for," said she, "this is the greatest trial I ever had. It will all come right, dear. It is not as though you had been suspended before. And you have said many times, you and the inspector have had long conversations about your engine; and you have said all sorts of good things about him, when other men have been suspended. He cannot help your being suspended, but you have told me of much he has done for men who have been unfortunate like you. Try and see him this evening, Tom, will you?"—"Yes, I will try," said Tom, "to drop on him if possible; but I know he will not like me to intrude upon him; that is, I am sure he will not like me to try and see him privately. If he should be on the station to-night he will talk; but I know him too well to do otherwise."—"Well, that will do; what more can you want him to do? I can quite understand that; but you can go on the station, and if he is there you can ask him if he thinks you will be discharged."—"But he will not tell me what he thinks, if he thought I was going to be discharged," said Cophit. "But, my dear Tom, you don't know what he may think," replied Polly. "Oh! but a man like he is, with hundreds of cases every day to deal with, the way he deals with them, takes time to think about them; he takes time, and aims pretty correctly.

I know from what men have told me, and besides, *you* know in neighbour Horton's case, he sifted the case thoroughly before he sent in his report; and besides," added Cophit, " his report will have to be submitted to the Locomotive Superintendent, who is his superior. " Well, Tom, you can have some tea, which is nearly ready, and then go on to the station. I shall feel all the more pleased if you will." And Polly set about getting tea. When it was laid they sat down in an atmosphere of love seldom or never experienced before. There was a prevailing influence of uncertainty that made them more than ever akin. Polly had put on a nice afternoon dress, and the salutary discipline of the last few hours had made her countenance more than prepossessing. Tom saw this, and although there was a cloud outside, there was plenty of sunshine indoors. After tea, he went to the station, though not without feeling his was a hard fate. Practically, he had not neglected any duty, or exceeded the limits of his sphere, either by word or deed. He knew how all the trouble had come about, and he resolved to cease boasting of what he knew, and what he could do. He resolved also never again to enter the inn, at any price. The inspector came on the six-o'clock express-engine, and Tom very respectfully inquired how the case stood against him. " I am going to investigate your case to-morrow, Cophit," said he; " and can you form any idea why somebody should have served you such a trick?" Tom told a true narrative as to how he had, in an unguarded moment, made light of a man being fined for reporting a crank-axle broken when an excentric-sheave was only shifted; and he regretted it. " Do you remember who was there?" said the inspector. " I do not know them by name," answered Cophit. " If I was to place a man before you that was there, should you know the features?"—" I should," replied Cophit. " Very well; come to my office to-morrow at three o'clock," said the inspector to the driver, " and we will see how we can get on at the case," and they parted. Cophit returned home, and related his interview with the inspector. " Did he receive you kindly, and appear to be *in good spirits* about your case?" asked Polly. " He always did speak to reasonable men kindly, and although he has many enemies, I always found him thoroughly practical, considerate, and unselfish, to a fault. He is going to investigate my case to-morrow at three o'clock. He will find out all about my case. I have heard the men say he never investigated a case but what he fetched the truth out of it. Bill Owen was telling me the other day of a case he had, for which the Traffic Department wanted to fine him; but when it came to be sifted, he was not in fault. Bill was putting a goods-train back into a siding, where they came in contact with some waggons, and damaged them. The yard foreman said he showed the driver a caution-light, and then a red-light. The under-guard, who was holding points, said he also saw the red-light, and the two contended the driver was not looking out. The report was made out by the yard-foreman. The inspector very quietly found that the head-guard was riding on the step of the van next the engine at the time, and, when the collision happened, he jumped off to see what damage was done. So when it was investigated, the foreman and under-guard had everything all their own way, and declared the driver was not keeping a good look-out. At last the foreman said the driver should be made pay for the lot, and went on ever so much about his not looking-out for signals. At last the inspector turned to the head-guard and asked him where he was at the time. 'Oh,' said he, 'I was on the steps of the van; but what has that got to do with it?'—'Why, everything,' said the inspector; 'you stood between the red-lights and the driver, and if they were to be seen, why did you not shout out instead of doing nothing? The fact is you did not see any lights, and that is sufficient to account for you not showing the driver a light, or shouting at him, and you not seeing them accounts for the driver not seeing them.'"—"Tom," said Polly, after he had related his story, "why can't you tell me all about such things every night when you come home, instead of leaving me at home alone? It's bad enough to be alone all the day; but it's a great deal worse to sit here alone, after the children have gone to bed." Tom felt the force of his wife's remarks; he knew that he had seldom told her about what he saw on the railway. Not that there was nothing to talk about in railway life, because if there is nothing there to see and hear, where would he go? And then her remarks about being left alone were most justifiable. He knew if he had stopped at home instead of going to the inn, the bitterness of suspension would never have been felt. For the refining fire, Tom was ever after deeply thankful. In the midst of his suspension, he was very happy, and he looked forward to the result of the investigation on the morrow in good spirits.

> "Happy the man who, innocent,
> Grieves not at ills he can't prevent.
> His skiff does with the current glide,
> Nor puffing, pulls against the tide:
> He, paddling by the scoffing crowd,
> Sees unconcerned life's wager row'd;
> And when he can't prevent foul play
> Enjoys the follies of the fray."

The object of the inquiry into Cophit's case was simply to find the culprit; all the rest was clear to view. The cause and its effect were too palpable to be discussed, and the suspension of the driver was ordered to take place, so that he might be goaded into activity and zeal to obtain a clue to the discovery of the rascal who had perpetrated such a foul piece of spite. The individual who does such work hires himself to a bad master, whose wages are exposure and infamy, sooner or later. Within the tender of the engine was found a small piece of cloth having two burnt holes in it, and this was carefully preserved. The cleaner of the engine stated he knew nothing about the matter, and he was sure that he did not put the soft-soap in himself, nor did he see anybody else do so. In fact he did not see any strangers upon the tender. He had some recollection of a dinner-cloth being burned by some of the fitters' labourers, who were larking together. He believed one of them put a piece of iron into the stove to light his pipe with it, and he run it through a cloth. He could not tell the man's name, but he should know him again if he saw him. He sometimes used soft-soap to wash the outside of the tender with, but he had not had any soap out of the stores for some time. The store-keeper stated he never gave any stores out without a foreman's orders, and it was a long time since he gave any to the cleaner of this engine. He had never given out soap to the fitters' labourers; had never put soft-soap in a cloth like the one shown, because he should have remembered the holes. He was occasionally absent from the stores between one and two o'clock; he left the boy-assistant there, and he never gave out stores, so far as he knew, without receiving an order signed by one of the foremen. The boy-assistant stated he never gave stores out without having an order, but the fitters' labourers came in and out for tools, and then often they would fill their cans up with oil, and they took a little tallow sometimes. He had seen them take soft-soap; he had supposed they washed their hands with it, but they did not take large quantities. He had seen the rag with holes in it before, and was present when two of the fitters' labourers were larking together; one put a red-hot packing-shover through it, but then there were four holes in it, and that is only half of the cloth. "I never give stores out without orders; but the fitters' labourers help themselves, because they have to come inside to lift the screw-jacks. I know whose cloth it was that was burned. It belonged to Jack Spindle. He frequently comes into the stores; he was in the stores some time back, at dinner-time, for a traversing-jack spanner. When he came in he said a lot of the cleaners were hiding the platelayers' tools under the ballast by the side of a road they were lifting. I went to see them, and he was left in the stores, but he was gone when I came back. He could have taken anything, but I did not think of that. I did not help to hide the tools, but I was accused of doing so. The platelayers missed them as soon as they returned; and when they were standing on the soil under which they were hid, they said they would 'punch' the first lad that came near them. Of course, I laughed; I could not help it, sir, because they would not try to find them themselves, nor let anybody else do so. They found them at last. One of the men stepped on to the point of a shovel, when the other end tilted up and hit his mate in the eye just as he was stooping to pick up something that had dropped out of his pocket. The foreman had us all in the office, and cautioned us against larking."

"Go and fetch the foreman of fitters here," said the inspector. "I want to know," said he to the fitter, "when any of your men worked their dinner-hour last, or when they worked their dinner-hour."—"They have not worked their dinner-hour for some time now," said the fitter. "We have not had a job in at that hour for some considerable time. I could let you know by running over to the shed." Upon the fitter's return he stated that none of the fitters or their labourers had worked their dinner-hour for some time. "I want Jack Spindle here," said the inspector to the cleaner; "fetch him at once. Tell him he need not stop to wash his hands, or open out his hair." As soon as Jack entered the office he took his greasy cap off and paid his obedience to the inspector, whom he loved as Old Harry loves a penitent on his knees. "Well, Jack," said the inspector, "what do you know about this case? Here is a man in charge of a passenger-train sticking on the road for want of steam through some soft-soap that *you* got out of the stores."—"That I got out of the stores?" replied the dupe.—"Whose mate are you?" asked the official.—"Sam Corbets's mate, sir," he murmured.—"And you and Corbets were working last Wednesday dinner-time; is that so, Jack?"—"I think we were," said he.

> "A lie which is all a lie may be met and fought with outright,
> But a lie which is part of a truth is a harder matter to fight."

Was it truth or a lie? A lie. And, then, it was a most deliberate untruth, and any one with a little insight into human nature could see he was fouling with facts. "You went into the stores last Wednesday, at dinner-time, for a traversing-jack spanner. What did you want that for?"—"I did," replied he *to* the inspector; "I went to tell the lad there was a spree outside."—"Do you know anything of this dinner-napkin?" asked the official of Spindle.—"Yes, it is my old woman's pudding-cloth, which she rolled my dinner up in one day," said he, "and 'Cranky-legs' run a packing-shover through it."—"It is," answered the inspector, "only a portion of your dinner-cloth. Have you a drawer or a lock, Spindle?" "I have, sir."—"Then give me your key, and let me see if I can find the other half." When the box was examined the other portion of the cloth was found in his drawer, and traces of soft-soap upon it, which left no doubt that he was the man who put the soap in the tender. So far so good. But if Cophit could recognise him that would be additional evidence. "Jack Spindle," said the inspector, after having spoken to Cophit about the affair of the inn, and found out that this man was there, "you are aware that this engine was disabled by as foul a piece of spite as ever came under my notice, through some soft-soap being placed in the tender rolled up in a piece of cloth having two holes in it; the cloth is acknowledged by you to have been once in your possession, and had it been the whole cloth I might have been inclined to think some one may have taken it and used it for this foul play; but it is in evidence that you were in the stores on Wednesday at dinner-time, and at that hour you had no business there. You tried to explain that away, first by *thinking* your mate worked that day dinner-time, but with the overwhelming evidence against you due to the presence of his foreman, you make another statement, to the effect that you only went there to call the store-boy's attention to a lark that was going on. Now, the two statements are inconsistent. Further, it is proved that this piece of pudding-cloth is yours, and this other half, found in your drawer, has soft-soap adhering to it now. Therefore I am of opinion, Spindle, that you sold this man a 'dog;' and you had no right to do it. What had he ever done to you in his life, a stranger amongst strangers, that you should not only cause him to get into disgrace, but, what is more aggravating, spit your spite at him, and delay the public trains, and put the passengers to such a degree of annoyance?"

CHAPTER VI.

THE ENGINE-DRIVER'S DOG.

"But the poor dog, in life the firmest friend,
The first to welcome; foremost to defend;
Whose honest heart is still his master's own;
Who labours, fights, lives, breathes, for him alone,
Unhonoured falls, unnoticed all his worth;
Denied in heaven the soul he had on earth."

A HOMELESS dog in London, choking with emotion, stiff with tramping, and hungry, entered the handsome porch at the grand entrance to Euston Square railway-station, which was full of excitement—all bustle, activity, and variety. Within the vast fabric, between the piles of luggage of wraps and bags, between the high, low, rich, and poor, the poor "doggie" tremblingly alive, trusting in his character for honesty, passed by the colossal pillars, waiting-rooms, and booking-offices on to the platform. There he looked searchingly about him, trying to find, amongst the many faces, one that he could recognise, or to find a voice addressed to him, when—unexpected happiness—he was saluted and caressed by the kind-hearted driver, who was no other than Driver Shelvey, who led the grateful animal on to the engine. He found him to be a little rough-haired dog, of a yellowish colour; with a pretty small head, a most intelligent eye, and a good deal of the rough terrier; and while piles of luggage were being brought into the vans, and before the departure-bell began to ring lustily, the "doggie" had been placed on the back of the tender, the circumference of which *was to* prove his world. Suffering had done much to quench all hopes of his ever becoming a carpet-dog. Whether he ever had any idea of being an engine-driver's dog is not known, but at all events he soon made himself at home, and he took an intense interest in signals. And so, in the easiest way in the world, by catching the swing of circumstances, he passed at a bound from the condition of a forlorn cur, with eyes dim and temper soured, into a position which no other dog occupied, and one in every way likely to make him good-natured and popular. But there is no telling how many nights in the streets, lying on stones huddled up, half frozen, he had experienced; how many areas he had searched for a bit of food; how many times he had been caught, kicked and beaten from square to terrace, before the evidences of his good-nature were obliterated, and before he was crushed by the ponderous car of neglect, until the pulse of his little heart beat with joy to find a home and refuge on the back of the tender of an express engine—a perfect stranger amidst so much that was passing strange, and yet content with present good, finding in his new berth, upon the tool-box of an engine, a world of wealth and keen enjoyment.

The "Duke," as Driver Shelvey was called, owing to his Roman nose resembling that of the Duke of Wellington, never afterwards travelled without his dog, whom he named Snatchburry. For years this intelligent creature made daily trips with his master between Bletchley Junction and London, running fast express trains in foggy as well as in clear weather, in the darkness of night as well as in the sunlight of day. Now trotting about Euston platform, impatient for the right-away signal; now going at sixty miles an hour, with a strong breeze blowing all the shaggy hair back from his pretty small face, disclosing a set of beautiful white teeth; now on Bletchley platform, hopping about on three stilts as proud as "Punch," and priding himself that *they* had kept time. He would give the "Duke" a look which was full of expression, as much as to say, "Well done our side." Every day he was gaining intelligence by culture, and he came to know the code of signals, so that when he saw a "red" light, indicating danger, he would call attention to it. He knew also, after a little experience, the route his master took each day. He could distinguish his own engine from others, although there were many others of the same class, of the same size, and painted in every particular the same.

Wonderful stories are told of dogs, which teach us that dogs are not inferior animals; that their powers can be developed and their natures raised, so that the idea of the animals being mere machines filled up with instincts, as an engine is filled with steam, is absurd. A dog's intelligence is developed by culture, the same as that of two-legged dogs. Let us not, however, be dogmatical, but stick to our subject. Master Snatchburry was for a period of ten years "on duty" every day. He sometimes found his arrangements all behind his master's in a morning, and so he had to follow him to the shed, where he would cock up his bright eye first at one engine and then at another, as he ran down the roads between the engines, and having found the right one, and some time to spare, he would take a look round and see if anybody was about to offer him a toothful. If he was very late, and he could not just find the engine, his anxiety would increase and intensify his earnestness, until it had worked him into a state of almost convulsive frenzy, making a series of leaps over the pits, to cut off the corners, accompanied by a whining cry developing into a sharp shrill bark. He would sometimes arrive just in time to join the engine when it was leaving the shed for the passenger station; but if he considered the time was too short to join the engine at the shed, he would go direct to the passenger station. On one occasion he came just in time to see his master going away; but, seeing it was a hopeless case, he made no fuss or cry about it, but walked into a quiet spot and dropped down, with his two fore-feet straight out before him, indicating health, strength, and happiness; and there he lay, taking stock of the trains running in and out of the station, until one came up which was going *his* way, the way that would enable him to join his own engine. He would jump on to the engine and *work* his way to London or Rugby, after Driver Shelvey; and, on the engine arriving at the platform, he would take a smart run over the yard from engine to engine until he found the right one. On one occasion he could not find *his* engine, for Shelvey had been sent out before his time after arriving at the shed, and it so happened he was sent in a contrary direction to that in which he had been accustomed to run. Snatchburry, when he came to the station, not finding his master there, nor in the shed, thought he must have been mistaken, and that Shelvey could not have left home; so he went down home, and put his head into each room, and gave a good sniff or two, and was then satisfied his master was gone. He ran off to the station again and took the first train for Rugby Junction; not finding Shelvey there he came back to Bletchley, and not seeing anything of him there either, he went to London and searched the yard over, but with no better effect; and so he came home again, tired out, to find his master at supper. How much of this intelligence he owed to instinct, how much to culture, or how much to brain is a problem. It is one of those "things which no fellow can understand." But it is enough that he had affections, loving and remembering, and thinking; and, further than that, when once properly housed, fed, and cared for, he never made the least sign of dishonesty, or any desire to return to London life. Snatchburry loved engines, and in his career must have picked up an acquaintance with a good many other dogs *en route.* The reflection tempts us into speculation. They would see he was a smart young chap, rather rough, but a good-hearted fellow, with the smell of engine-oil about him, and with an unaccountable amount of cheek to be running into the vans and asking every dog where he was bound for; but their courage would be raised with his kind speeches about his being "on duty," and he could assure them that the oscillation and noise they would feel after starting was simply a way the iron horse had when he was scampering away as fast as he could be made to do so, and the best thing for them to do was to drop into a nap until *he* barked for the driver to stop; and so to their great joy travelling dogs would remember the good services rendered *gratuitously* by the good-natured driver's dog. Snatchburry had learned to distinguish colours; and he distinguished stations from private residences. On seeing a red light he would bark, and also on approaching a station; but he also knew that a fog-signal indicated extreme danger, and when the wheels of the engine went over some, followed with a *bang*, *bang*, he would rush frantically round and round the tender, no matter how high the wind was or the speed, or how cold and bleak the air was, in hurricanes of snow and in the midst of perils he called aloud *his* warning high into the air. Driver Shelvey possessed all the knowledge which renders a man fit to run fast and important trains. There were no intricate questions concerning railway working but what he held the thread of; nothing unapproachable, all easy of access, from the leaking of a belly-stay in the boiler to an undeniable break-down. He ran the most important trains; he ran every trip with success—day after day, for months, for years. His enginemanship was unquestionably sound, and men everywhere knew it—men of authority and experience. Still, on one dark November afternoon, within half an hour after leaving Euston Station with the five o'clock express, his engine was hurled from the iron track right across the other line, over which the engine fell on her side. Shelvey was killed and Snatchburry was saved. As soon as possible search was made for Driver Shelvey amongst the débris, and he was found with the dog standing by his side; and, following the corpse to the goods-shed, where it was temporarily placed, Snatchburry could only be removed by force.

When his master's body was placed in the coffin he moaned and cried most piteously. On the day of the funeral, two black rosettes were attached to his plain but neat collar, and he was led by poor Shelvey's fireman, who, fortunately, was spared. He succeeded in breaking away from the mourners, and ran along to the coffin, and at last Craffe was obliged to carry him in his arms to the grave side. For some time after the funeral the mourner felt the loss of that friend who befriended him when he was only a poor little homeless cur, and he could be quieted only by kindness. Driver Green, an old friend of the "Duke's," would sometimes take him to his late home, when his moans after his old master would recommence, and he could not be pacified until some of the deceased's clothes were placed near him. Nothing would stay his cries and lamentations so effectually as bringing out his late friend's boots and placing them on each side of the fire where poor Shelvey used to place them after he had done his work. He would then lie down by them and watch for hours, evidently expecting the return of the owner. Alas! he was no longer in the busy throng; he had travelled life's railway, all stations were past, and he had been stopped in death by an unfortunate mistake. A goods-train was standing at Harrow Station; and, with signals in his favour and the darkness of the night preventing his seeing his danger, he went right into the train. After Shelvey's death, Snatchburry was taken charge of by Driver Green, who took great care of him until the poor little "doggie" entered into his rest, when all that was mortal of him was scrupulously attended to; and he is now in a little glass case as anxious-looking as ever.

A beautiful little English terrier took a fancy to travel on the trains from King's Cross to Doncaster, York, Grimsby, Lincoln, Boston, and Peterborough. It would not stay on any particular engine, but would go with any engine-man it took a fancy to; it would sit up on the tool-box on the tender, its delicate ears blowing out in the breeze, and its dark shining coat as smooth as a newly shelled chestnut. It was its way to call in the engine-men's room, and stay for a day and then go for a trip, always choosing an engine that was starting on a journey. It preferred to travel express, and was often seen with Tom Pepper of Peterborough. It was very fond of Tom; sometimes it would do a day's shunting in the yard at New England, and the next day you might see it watching the fireman of a goods-train eat his luncheon in Retford whilst waiting for fast trains to pass.

CHAPTER VII.

SUDDEN SURPRISES.

It sometimes happens that no extent of experience and study of railway working can prepare a man for any occurrence that happens on the railway. There swoops down upon a man at times a surprise, the like of which has not visited any one before; and, quick as lightning, the greatest evil or the greatest good is done on the spur of the moment. An occurrence of this kind once fell to the lot of an old and experienced driver, in charge of an express-train going north. The train left the Metropolis at its proper time, and was running under full steam, when the driver suddenly saw a goods-train crossing the line in front of him. He could not stop within the distance for want of brake-power. He remained on the engine almost to the last, but not three seconds could have elapsed between the sailing along, in all the majesty of power, and entering the eternal world. Both driver and fireman decided to jump and brave accidents. One leaped on the right side of the engine and the other on the left, but the train passed on between their lifeless bodies. They were dead; both of them. The engine rushed into the goods-train, and cut waggon after waggon out before she stopped, and then she was upright and almost uninjured, and none of the passengers were killed.

There is a speed bordering upon instantaneous death, resolving fate at once; but scores of engine-men have jumped and injured themselves, whereas if they had remained on their *engines* they would have been unhurt. In collisions like the above-mentioned, it requires more than human judgment to decide what is the best thing to do. If we take the case of the accident to the Irish Mail at Abergele, we find the fireman in the débris and the fire, burned to a heap of ashes; and the driver, who jumped off to save his life, so injured that he survived the shock only two weeks. Now, in the Sittingbourne accident, the engine plunged into the trucks at about thirty miles an hour, and scattered them right and left; but the driver and the fireman were carried on their engine safe through them, although several passengers were mortally injured. The accident occurred in broad daylight, and the engine-man and the fireman had time and opportunity to jump, but they chose to remain. It is impossible to advise what to do under such circumstances. Had the Sittingbourne trucks contained oil, like those at Abergele, the men would have been burned to death! and, on the other hand, if they had jumped off at thirty miles an hour, the chances are that both would have broken their necks.

A case occurred on one of our principal railways at night, which alarmed the driver very much. Had it happened in daylight it would have cost him his life. He was steaming south, with an express-train of eighteen carriages, at forty miles an hour, and, when passing a junction, he struck four trucks, and sent them flying, not only clear of his road, but clear of both roads. The waggons had been shunted on to the main-line by mistake, just as the express came up, and therefore they were in motion, which accounts for the engine buffer-beam being comparatively uninjured. The collision was so sudden, that before the driver and the fireman knew what had happened, all was over. The engine knocked beams, diagonals, and axles in a tempest, clear of her course, and would have continued; but, of course, the driver stopped, whilst the rear-guard was ignorant of what had happened. Now, the driver declares he should have jumped had this occurred in broad daylight. We have the Sittingbourne accident, in which the engine-man was safe at high speed. *But*, although it is the safest plan to keep to the engine, one never knows what the trucks contain. As not one truck out of ten thousand contains oil or gunpowder, we may conclude from experience that, in cases of pending collisions, it is best to remain on the foot-plate. A driver of a fast express collided with a goods-train in a curve. The goods-train had stopped within the distant-signal, and the signalman neglected to protect it in time. He, in fact, was not at his post when the goods-train arrived, ten minutes behind time. The train should have been in the siding, shunted clear for the express. The express-driver, having a thorough knowledge of the traffic, as well as of his engine, expected to pass it at this particular spot. On sighting the distant-signal, it indicated line clear, by exhibiting a clear, white light. When he came into the curve, he saw the three red lights on the end of the goods-guard's van, and, even then, he thought the goods must be in the siding, and that the guard had neglected to change his tail-lights from red to white. He had shut off steam, having a doubt of the position of the goods, when the flying steed went right inside of the van, and a fair slaughter of waggons took place; some went flying to the right, and others to the left; and although twenty waggons were cut out of the goods-train, the express engine remained upright. She left the rails when she struck the van, and rode on bent axles, broken chains and rails, until she stopped. The buffer-beam was smashed, the chimney and smoke-box damaged, but neither the driver nor fireman was hurt, and many of the passengers knew nothing of the danger they had been in.

This was an affair that took place in the dark. Had it occurred in the day, the probability is that both the driver and the fireman would have jumped, and injured themselves. Now, this was another instance in which the enginemanship avails nothing. The driver was a man who knew every train on the road, and looked out for them, and when he had passed one, he looked for another, and so on, to the end of the trip. But the accident could have been prevented by the use of the block-system which is now nearly universally adopted.

The down Scotch express was going down Retford bank, signals all clear, when Oliver Hindly saw a train going east *from Sheffield to* Lincoln which would meet him on the level crossing. He could not stop, and with that clear mind which is so marked in Englishmen in time of danger, he put on full steam, and sent Mr. Sturrock's beautiful express-engine clean through the goods-train, scattering the trucks like match splinters and carrying all through safe. When asked about the matter, Hindly said he could not keep clear, so he would clear away his obstruction. There is no doubt that had he hesitated or feared many lives would have been sacrificed. No. 210 engine carried the dents and scars like an old warrior, and looked handsomer than ever for this brush with the enemy of express-trains.

The principle of the block-system is this: the signalman must not allow two trains on the line between his cabin and the cabin of the next signalman in advance. Signalman A telegraphs to signalman B to know whether the line is clear; and, having received an affirmative answer, he allows the train to pass his cabin and approach that of B, and when it has passed him, he informs A of the circumstance. If the train goes on all right, he will tell him so; if it stopped at his cabin, he would wire line blocked; and A would hold back the next train that comes on. He could hold on to one, because he would wire to the man who sent him the train, line blocked; and when that had got another train, he would hold that back, and wire to the man who sent it, line blocked; so that, in case of serious failure, one train may have been stopped at each signal cabin over a length of fifty miles. But, nothwithstanding all the precautions on the part of the railway directors to make their line safe by working on the block-system, the best of rolling stock on most solid of tracks, accidents will happen. Soon after the block-system was introduced on railways, a signalman had sent on a goods-train to the next signalman, and an express-train being due, he was anxious to obtain the signal clear. The goods were a long time on the road, the night was dark and wild, and lightning was vivid and frequent, accompanied by loud peals of thunder. Now, lightning affects telegraph instruments. The indication of "line clear" was at that time given by *one* ring on a bell. The signalman was looking out very anxiously for this ring, for the express was due, and there is always a bother about stopping or even checking an express. All at once a flash of lightning ripped down an oak tree by the side of his cabin; and the electric fluid, acting like the battery, rung the bell. The train was near, down went all the signals, and on went the train right into the goods-train. The guard's-van of the goods had a lamp in the centre of the roof, and when the passenger struck the van, the lamp was projected into the air, and then fell down on to the engine foot-plate between the driver and fireman, with such a crash that they thought it was a thunderbolt, and both jumped off unhurt. Here was a lesson! "Line clear," and other messages, are given by two or more distinct rings.

Now, a sudden surprise was once sprung upon a driver, named Brewood, which was in no way whatever related to those above noted; but it was a fearful challenge to grapple with a tremendous railway difficulty, and make the best of it.

Difficulties have always been found to bring out the qualities of an individual. Biography impresses this fact upon us. Sweet are the uses of difficulties, for they develop character and bring to the fore the capacious powers which lie folded up in a man, sometimes to such an extent that an individual is half-scared at his own daring. Driver Brewood was in charge of a goods-train, consisting of twenty-four waggons of Aberdare coal. There was a bank to descend of 1 in 80 for five miles; then a level to run over of one mile, and then another bank of 1 in 85 for a length of six miles, which terminated at a meeting station. The line was a single line, and trains coming in opposite directions passed by means of sidings at the appointed meeting station. Before the train was started from the top of the first incline, it was customary to put some, if not all, the brakes down, so as to enable the driver and the guard to control the train.

One very dark night the driver received the "right-away" signal, and he started. All went well until he reached the level between the two inclines. The fireman generally handles the brake, and keeps easing it "on" or "off" as circumstances *require.* When they reached the level, Brewood was struck by *the speed being* so soon reduced, and at first thought the guards had put all the brakes down in the train; so he took hold of the tender-brake, and after giving it a turn of the screw he found he stopped the train. In an instant he turned it off, and put on steam. He knew he had broken away, and the regulator and engine soon informed him he had but a few trucks behind his engine. He went over the back of the tender and on to the waggons. He found he had four, and he returned, and hastened down the second incline to the meeting station where he was timed to pass the "Black" goods. They ran into the siding, the points of course being set to receive them. After he stopped, he sent his fireman to meet the trucks which had broken away. At the top of the yard, the black goods stopped to put off trucks; but misfortune never comes alone, they were not there or in sight. Brewood rushed to the station-master's house door, and with a huge stick unmercifully hammered into one unfortunate panel until the official threw wide open his bed-room door, and was going to remonstrate, but the driver lost no time. "For God's sake come out, there are twenty waggons of coal coming down the bank like the devil. I can hear, by the Lord Harry, there will be a smash. Come out quick." The station-master slipped on his pants and socks, and out he came with his nightcap on. "What can we do?" gasped Brewood. "Why, turn all the lot into the river below," said the frightened agent running to meet the train; adding, in hot haste, "Look sharp with the hammer, Brewood, and we shall have time to spike the back road points." Just as they drove in the spike, Brewood sprung into a pile of chairs, and shouted, "Bring a few iron chairs." They laid them across the metals as near as they dared, and off they ran out of danger. The waggons drove over the chairs, and then followed a crash. The first two dropped into the ballast and formed a stop-buffer for the others, and none went into the river. The driver and the agent ran to the débris, to look for the guards, but the guards and their van were nowhere to be seen. In the darkness they could hear it coming.

The two guards in the rear noticed on the level between the two inclines that they were going rather too fast, but they did not notice it until the train had obtained a very high speed for the weight. All doubts about the matter were soon dispelled. They knew that they had broken away from the engine, and what alarmed them was the fear that the driver did not know it, and not hearing the engine whistle they were both of opinion that their train would overtake him, and so they expected every minute to be smashed. To jump at that speed was certain death. They knew what could be, and what might be, but they did not know what would be. They were for once with their lives in their hands. The black goods would be in the station, and Brewood in the siding, and there was no other course but to turn them into the back road, and that meant into the river. Like men with death staring them in the face, they made an effort for dear life, resolved not to surrender it without a desperate struggle. With the lamps glimmering in the weird darkness they clambered from truck to truck to put down more brakes. They did this like heroes, but the momentum of the waggons gave them no hope of stopping them. They had done all that they could, and it was plain that a dreadful collision would take place. The head guard thought the black goods might set back, and give the run-away trucks time to stop on the level; "but I shall jump, mate, if we meet a red light, because that will show that they have done all they can, and that still there is danger." "If we jump," replied the under guard, "we shall be killed dead on the spot." "What is it to be, jump or not?" shouted the other. "Jump, mate, good-bye," and each went to jump; but when men are in such a trying position the falchion of the intellect cuts into the scabbard of the brain. "Here, mate," shouted the head guard, "we are saved. Bring that hammer out of the locker, sharp." He himself took up a shackle hook, and knocked a hole into the end of the van over the coupling; and, with life and death in sight, the under guard eased off the van-brake, and the head guard knocked the bolt out which attached the truck next them to the van: and they were living men. They had scarcely become free before they saw the fireman's light, and they pulled up to pick him up. The van being on the incline it would start by the force of gravitation. When they came to the débris they saw what a tremendous hit it was to hook off. "I assure you," said the head guard to Brewood, "it was the thought of an instant, prompted by the instinct of self-preservation. I suppose when the wheel of fortune comes off, it stirs a man up a bit. I have been on the railway close upon twelve years, and in that time I have been knocked all round the van, but I never had an escape like this. Hooking off the van was simply a divine interposition of providence." They left the van where they had stopped it, and walked to the trucks; and, whatever was in fortune's power, they all saw each had had his share that night. There may be storms at sea for sailors, but it is quite certain that a sight presented itself that convinced them that on the railway there are perils for engine-men, firemen, and guards.

An occurrence that took place a few years ago will illustrate the importance of railway men being always on the alert to act upon incidental hints which at first sight appear uncommon. A goods-train, having two engines attached, was proceeding south at midnight, and after it had passed a fast express-train, a thought struck the driver of the express train that for two engines it was a very short goods-train. He stepped over to the fireman's side of the foot-plate for the purpose of seeing whether there were any tail-lights on the last vehicle; but owing to a curve in the line, he could not ascertain that point. He, however, shut off steam, and gave instructions to his mate to have the brake in readiness, "for," said he, "it strikes me very forcibly, mate, all the train is not there." When they had run about two miles, and were thinking of getting up the speed again, a red light was seen ahead surging violently from right to left. They pulled up at once to it, when a goods guard informed them, as he held his bull's-eye light into their faces, that a waggon-axle had broken in his train, and had caused twelve trucks to leave the rails, and that they were across the down-road right in the way of the express.

The guard got up on the step of the engine, when they pulled gently down to the scene of the accident, where they saw that it requires heads that think and eyes that roll, as well as simply engine-men, to make railway-men of.

CHAPTER VIII.

PUNISHMENT AND ITS ADMINISTRATION.

THE administration of punishment on a railway, which is a little state, is a serious duty. Without punishment, there would be a total loss of power and of salutary influences. Offences may be classed under the heads of breach of rules, repeated disobedience, constant idleness, bullying, gross insubordination, and, worst of all, drink. A driver of goods-trains, out for very long hours, gets tired, has to wait long for a passenger-train to pass, yields to the temptation, and goes into a public-house, with guards, traders, drovers, and others; and in time is sure to come to grief. He is wanted, and is not there; or his engine gets short of water and the fire is low. All at once, the signal "right away" is given, and Driver Unstable is off; and when he sticks on the bank short of steam and water, he begins to repent that Dick Easy got him into the beer-shop.

In dealing with offenders, it is necessary to consider not their services, but their dispositions, and the general welfare of all. Punishment does not amount to dismissal unless the delinquent is an hardened offender. Dismissal is a serious matter, for justice herself makes a marked distinction between wilfully bad conduct and thoughtlessness. The real sting of punishment should lie in the fact that it has been sought for. There is no disgrace in being punished for what one never had any thought or intention of doing. The idea of such punishment is repulsive to the sense of right and wrong; and when the mistake is made, the individual becomes a martyr, not an offender.

Then, again, punishment is to be administered with the greatest care, with a knowledge of human nature; for, what would break one man's heart, might be felt by that of another but lightly. Or, it may even harden the heart when the punishment is inflicted in anger, or vindictively, or for temporary revenge, or for self-interest, or for applause.

The creed upon which punishment is inflicted should rest upon a purely rational basis. Punishment is no doubt a difficult task for some men to perform—men who have strong opinions of their own, which may be compared to a body, weighty and tall, moving forward with great rapidity. So long as it proceeds in a perfectly straight line a catastrophe may be avoided, but should something necessitate its *taking a curve*, why then look out. Something will happen to *itself* and to its *neighbours*. To feel strongly, and yet to analyze coolly; to be susceptible to a force, and yet free from its influence; to be moving with the stream, and to be standing on the bank, are specially difficult duties. But the power of such many-sided action should be possessed by those who sit in council. Such power is indeed a testimony of intrinsic force. In a word, there must be a judicious appeal to the sense of right and honour, self being conspicuous by its absence. The hardest of all feats is to see what is before our eyes.

If a man has had great trust placed in him—wide license given to him—the loss of liberty to act would be a dreadful punishment. He should be allowed to act; not allowed to decide.

With regard to the imposition of fines, it may be laid down as a general maxim, that it should be of such a nature as to do some positive good. The sting of punishment has been inflicted by some superintendents in a novel way.

Driver Sparrow was always—that is to say, oftener than others—before the board of inquiry, consisting of the locomotive superintendent and his assistants. The man's offences were not marked by gross insubordination, but repeated instances of thoughtlessness. He would run short of coals, simply because he was afraid to take too much. His notion of coal was peculiar. No, he would not have a bit more; he would try to make what he had in the tender last him. The consequence was that, on several occasions, he had to make a special stop with his train to get a few hundredweights more; and, on one occasion, when some of the officials were in the train, instead of stopping to take in fuel, he burned the tool-boxes, and all the old clothes in them, and several pounds of tallow, together with the lid of the tender, and the foot-board, which just saved his bacon. On another occasion he stopped at a country road-side station and borrowed some coals. For this he was fined a day's pay. The next time, he stopped by the side of a waggon of coal which he spied on the road, and helped himself from it. He took the number of the waggon and reported the case. He never tried to hide anything, and he did things as calmly as possible. The guard would shout, "What are you stopping here for?" "Oh!" Sparrow would reply; "I have got a bit of bad coal in my tender, and this 'ere is tidy good; give us a hand a minute." It was against all rules and regulations to delay a train for such a purpose, and he was fined again, and made pay for the coals, which belonged to a coal merchant. He again ran short of coals and helped himself from a waggon, the proprietor of which desired to charge him with stealing them. He got into much trouble. The case was allowed to proceed a certain length, to frighten Sparrow; and it had the desired effect. Fortunately, with all scheming for coal, he had never taken a coal premium; or the coal-merchant would have had all his own way, and Jack Sparrow would have been "caged" for a time. Strange to relate, he no sooner left off one class of thoughtless acts, than he betook himself to another class—not minding his time-table properly, calling where he should not, and running past where he should have stopped—offences which generally occurred on the first day of the month. At a certain station where he had not been in the habit of calling, seeing the passengers he shut off steam and stopped. "Fetch that time-bill, mate. By Gom, them's our passengers," said he. The time-bill was consulted, but he found they were not. A little further he saw another group of passengers at a station. Those he took no notice of; but, when he stopped at the station beyond that, the agent asked him if he stopped at Slade Heath. "No," said he. "But," replied the agent, "you should have done. What am I to do? I have neither an engine nor a carriage to fetch them, and you must go on. You have put me and them into a fix." However, the agent had to consider what was the best thing to do, and by telegraph he found that there were eight passengers. The distance was five miles; he sent a waggonette for them, and Sparrow had to pay for their ride.

His next offence was to take a gentleman twenty miles beyond his destination, whom he was told to set down at a certain place. It was the last train at night, and Sparrow had to pay the gentleman's hotel bill. He turned up again for having two gentlemen on his engine one night with the mail, for which he paid two sovereigns—the regular fine. Next, he started away from a station without looking back, and left the rear guard behind. The head guard gave the signal; but it is the duty of the driver to look back, after starting, in order to see if any passenger may be jumping out. This frequently happens; passengers sit still during the time the train is at the station, and when it is on the move they think of asking if that is such a station; and, finding it is the very station they want, they frequently jump out, or rather tumble out, even when the train is going ten or fifteen miles an hour.

To Sparrow once more; and this is the climax, all through not looking back. He backed on to a train; and in time he received the all-right signal to go. Sparrow had noticed a travelling official on the platform. When he arrived at the first station where he was timed to stop, a porter was sweeping the platform with a broom, professionally to and fro. "Look out, my lad, he's in here," said Sparrow pantomimically, with his thumb cocked up and his fingers closed, as plainly as his fist could speak.—"Ah! ha!" cried the lad, "not him; thou hast got no carriages." Sure enough he had not; and, incredible as it may appear, he had run six miles without looking back, or finding out by the working of the engine that he had left his train behind.

What could be done with such a man? "Discharge him," some would have exclaimed. But, with all his faults, he broke no bones or waggons, nor neglected his engine, nor absented himself. He had reached his climax, and the best thing to do was to forgive him for this, and inform him that for the next offence he must take his discharge.

"You quite understand," said the superintendent to him, "that your term of service ends with your next offence. I have no more to say to you; the time of your stay in the company's service is in your own hands, when you think proper to 'snuff' yourself out. Your back week's pay will be paid you by making an application to the time-keeper." Sparrow is running now, and has been running for years since he left the train behind, and got the option of "snuffing" himself out any minute.

To forgive an offence has, on some natures, a beneficial influence. In this case it secured the services of a steady driver for years.

Some very strange cases are sometimes inquired into and dealt with according to their merits.

An express-train, in charge of two smart men, was travelling at forty-five miles an hour, when the engine became uncoupled from the tender. It happened when the fireman was on the tender breaking up some coal. They coupled them together again, and neither the guard nor passengers knew it; and it would never have been known had not some farm labourers, who saw the engine shoot away from the tender, have narrated the circumstance in a neighbouring town, where a station-master heard of it. He reported the talk to head-quarters, from whence instructions were issued to inquire into the case. When the right driver was found, after some difficulty, he did not deny it. Both he and his fireman were summoned to appear before the board of inquiry, and full particulars were obtained of all the circumstances.

It appeared that when they were going at speed, the coupling-pin, which unites the engine to the tender, broke, and they separated. The engine shooting ahead broke the side links, and pulled the feed-bags out, leaving the fireman on the tender. *They saw at once* how matters stood with them, and the fireman was going to put the tender-brake on; but the driver ordered him to allow the train to run, and fetch a spare coupling-pin from the back of the tool-box. By the time the fireman had done this, and lifted up the flap of the tender, the engine was under control, and was, in a trice, buffer to buffer with the tender. When all was made ready for the coupling-pin to be dropped in, the engine was sharply reversed against the momentum of the train, sufficiently to extend the draw-bar spring, and they succeeded in getting in the pin.

The mishap took place when they had run seventy-five miles out of eighty-five miles; and, the boiler being fairly supplied with water, they managed without turning on the feed. After they stopped, every exertion was made to put the feed-bags right and square; and, as there had not been any delay, they thought the whole affair was squared, and therefore they thought there was no need to make a report of it. No one knew anything of it but themselves, and if they had told the guard, he would have made a mountain of a mouse, and send in a report a yard long to his superintendent, which would come round to their "governor," and from him to their foreman, and from him to them. So, saving all this reporting, they would have succeeded in smothering the affair, but for the peasant's astonishment at seeing an engine bolt away from the tender and the train, and seeing the driver jockey his engine as they never saw before. It was a very smart piece of work—too smart to be recognised. They were advised not to do so again. Under such exceptional circumstances it is much better to stop.

Not experience alone, but judgment also, is required to grapple with railway difficulties; and one cannot get together too much information respecting what others have done, and what others have omitted to do. A general of renown, whenever he was out walking in times of peace, was in the habit of speculating how he would marshal his soldiers to take places which attracted his notice, and how he would make a retreat, in case of being defeated, with the smallest loss to his army.

It is this kind of forethought which helps railway-men. The want of it sometimes helps them and their waggons to grief.

A driver of a goods-train, consisting of thirty-five waggons and the brake-van, was proceeding one dark night over a piece of road infested with inclines; now 1 in 80 *up*, then 1 in 80 *down*. He had arrived at the top of one bank, when, it was supposed, the train broke asunder when it was hanging over the top of the hill. He proceeded down the hill, and thought the whole train was following him; but, when he began to climb the next hill, he found by the work of the engine that he must have broken away. He stopped, not being sure where he had left the remnant. He was no sooner on the ground than he heard the remainder of the train close upon him, and he had only just time to shout for his fireman to jump off, when it ran with tremendous force into what waggons he had, and piled them right over the engine.

This engine-man no sooner found that he had lost a portion of his train than he stopped—which in the dark is a very injudicious thing to do, because he knows nothing; what he supposes, or thinks he knows, is presumption; he is just as much in the dark as the waggons are. In such circumstances he should not have stopped, but should have taken the precaution to keep clear of the trucks. Admirable assistance to the men in such circumstances is given by side-lights on the brake-vans, because they can be seen from the engine very distinctly, and they enable the men to form a judgment, thus aiding in preventing accidents.

Accidents similar to the above have happened with passenger-trains, through the couplings breaking when coming over a bank. It is not every driver who knows how to climb hills with a heavy train. When half of the train hangs on one side of a hill and the other half on the opposite side, it is only reasonable that the engine should be slowed after turning the hill, in order to pull the train over it without increasing the speed with which the engine arrived at the top. Many men, so soon as they reach the top of a hill, when the engine feels the power of gravitation in its favour, accelerates its speed most rapidly, thereby putting an extra strain on the couplings at the summit of the hill. Again, in running down an incline *with a bank at* the end, the speed should be increased before the bottom of the valley is reached by the centre of the train. Speed should be increased by giving the engine a little more steam just before reaching the valley, in order gently to pull all the couplings taut, and to run across the bottom of the valley pulling. Some men run half-way *up* a bank, taking advantage of the power of gravity acquired running down the preceding hill, before they give the engine full steam, but such men are often fined for breaking away. Then, again, men are sometimes fined for sticking on a bank with a moderate load, and delaying other trains behind them. At the same time, they insist that they had a boiler full of steam, and that the steam was even blowing-off at the time. Very true, but it is possible to have a boiler full of steam and not know how to use it. To climb a long bank with a heavy train, some men think that all that is required is a boiler blowing-off steam like "mad;" and though the engine may slip two or three times, and stick, no man, they think, can do any more, and they conclude that the load is too heavy for the engine. It is nothing of the kind. The true cause of the engine's slipping—of course we are assuming the rails are dry and not wet—is that the steam is too impulsive upon the piston: that is, it acts for a *moment* with too great a pressure, or it could not force the wheels round. If the pressure of steam be too high and you throttle it, it will accumulate in the steam-chest until it is too much for the adhesion of the wheels, and hence slipping. Now instead of the engine blowing-off steam, she should rather be inclined to be short of steam, so that the lever can be placed well over, and the regulator full open, and that the steam can be allowed to push the piston nearly to the end of the stroke, following it up with an even pressure, instead of thumping the piston with high-pressure steam and knocking the wheels round. It may be asked, why not wire-draw the steam by the regulator, and have the lever in full gear? Because you will not get the same results if you wire-draw. We know where wire-drawing begins, but not where it ends, and besides the load will require a higher pressure of steam than wire-drawing admits of. To climb a bank with a heavy load, have the lever well over, and the regulator well open, and the steam so low that the pressure on the piston does not exceed what is required for tractive power; and as the bank is climbed, lift the damper or close the door, for more steam and more power, but leave the lever and regulator alone, unless absolutely necessary.

By such management many a man has been saved from being fined for slipping on a bank. To slip on dry rails shows distinctly that the engine-man does not know his business. Should the engine slip, drop the damper until the pressure in the cylinders becomes insufficient to slip the wheels, though sufficient to draw the train. The slipping of wheels on a bank, or in starting from a station, is produced by one and the same cause; but the engine requires different treatment, as already shown.

Another point on which many men get fined is shortness of steam, which may arise from many causes. But those causes by which engine-men are mostly affected are choked fires and dirty tubes. Choked fires are the rule with young delinquents, and more engines become short of steam and lose time through bad fires than from any other cause. What is understood by a choked fire is this: it is made too thick for the engine-blast to pull air through it, and it will not make steam, for want of heat, as fast as the steam is required to keep up the speed of the train. One would think that with every inducement to save coal, by premiums, there would not be any choked fires; but the evil lies in the fact that where the mind possesses no fixed principles for its guidance, every process is surrounded with mystery, and the left hand cannot comprehend the doings of the right, nor can the head or the hands render any assistance to each other, for every change is involved in doubt. To avoid choked fires, the best and only plan is first to understand the principle of combustion, which is very simple. More coal must not be admitted into the fire-box than what is sufficient to allow the air to pass through it. If we get hold of a coal we know little or nothing about, it is wise to use a low fire *and work it.* The best shape of a fire for making steam, and not clinking, is the concave fire, hollow in the centre and not unlike a tea-saucer or a small dish. The generality of men who are fined for being short of steam have no proper shape of fire, nor a likelihood of one. The coals are rolled into the fire-box, and, in many instances, the fire is thick with a stir-about of clay, which trickles down to the bars and forms itself on them into a stone floor or barricade, by which the air required for generating heat is prevented from entering.

Dirty tubes are another cause of fines. Some men will clean their tubes every day; others will run several days without cleaning out. The best plan is to clean the tubes as frequently as it can be done; but clean them with fire, not flax, every day. If we put a kettle coated or rather caked with soot by the side of a bright fire, we shall soon see the caked matter peeling off. So it is with the tubes; when a very hot fire is on the grate, and the gaseous products are drawn into them, the peeling process comes into operation. No doubt many a man has noticed his engine steaming amazingly well, as the fire was low. This is the cause; the tubes have been cleared of soot, and the bare metal is exposed to the heat.

Over-shooting signals, or mistaking signals, is considered about as serious an offence as a man can commit, because no one can have made the mistake without having failed for the moment in his duty of taking all necessary care of his train. But, in numerous instances, the offence is committed through the wonderful elasticity of action encouraged by familiarity.

Some of the most experienced drivers have come to grief through their habits having become set. Now the sure way to avoid running by signals is to forget that the signal has ever been seen before, and to maintain day after day the same anxiety to sight it as was done in the first instance, or when we first run past it.

Half the signals which are passed, and the collisions which occur through running by them, happen by the drivers not looking out for the signals in time. A man may run over a road and find a distant-signal always "off" for him at some road-side station, until he has lost sight of it, excepting just a glance; and he may not give that glance in time on an occasion when, of all others, he should have seen it, and, before he can stop at it, he is in collision with another train. Not because the signal could not be seen from a long distance off, but the familiarity of seeing it off so many times, for so many years, has brought with it indifference. Approach every signal, and sight every signal, as though it had never been visible before, and run the road every day as carefully as at first; then the fine-sheet will be a blank for cases of over-running danger-signals.

A signal half "off" and half "on" is very often a tempting trap for a man who is in haste to form an opinion about it. It should there and then be treated as doubtful; there should be no whistling or time lost in testing it; the steam should be shut off, and if there is any delay through it, then the defective signal should have the blame. Some scores of men have been fined, and have brought their department into trouble, by endeavouring to be too clever in distinguishing right from wrong, when the truth was only known in the signal-box, and not on the foot-plate. For over-shooting signals, nothing will save an engine-man from being discharged except a clear good-conduct bill. But that will not save a man from burning a boiler; though this is a rare occurrence, which only happens when extreme carelessness has prevailed on the foot-plate. It is generally brought about through the gauge-glass not working properly, and showing false water in the glass. This is caused by the top water-way into the boiler being clogged with dirt. When the waste-water cock on the gauge is open, the water runs out, and when it is closed the water from the boiler fills it again. That may be assumed to be correct; but it may be false, and a man may have his glass three-parts full of water at four o'clock, and find the lead plug go at 4.15. Nothing will persuade him that the boiler was short of water, and nothing will persuade his master that it was not. When the top water-way is made up, the pressure of the steam upon the water within the boiler forces it up into the glass; and so long as there is any water near the lower water-way, the water will continue to appear in the glass; and when the water sinks below the water-way, the steam will keep what water is in the glass there until the lead plug goes; and then, the driver seeing *water* in the glass at the time, sticks to his view, and the master, finding the crown of the fire-box down, reasonably concludes that the driver is telling an untruth; whilst the driver reasonably concludes he is hardly dealt with for being discharged. That the fault is due to his negligence cannot be denied, but it is unsatisfactory when the facts are against the evidence, and there is no getting at the truth.

Water in the gauge-glass may really signify absolutely nothing, unless the top water-way is perfectly clear, and hydrostatic equilibrium can be established in the gauge-glass. Much confusion and many lengthened inquiries have taken place through lead plugs blowing out, when, afterwards, the boiler was found to contain plenty of water. Much time would be saved were there two plugs in the fire-box, as practised by Mr. Sturrock. We have duplicate gauge-glasses, which is an admirable arrangement; and why not have duplicate fire-plugs?

The infliction of a fine for not examining an engine before leaving the shed is common; but there is one way of getting over it, as long as a man is upon a railway, and that is to make it a matter of conscience never to turn a wheel without examination. There is not much to do. There is no danger of the boiler tumbling off the frame, or the smoke-box leaving the boiler, or the crank-axle turning end forward. The examination may be all done in fifteen minutes, and if an engine is habitually and daily examined, it can be overhauled in less time; but supposing it takes fifteen minutes to look into the ash-pan, and to see that all the pins and cotters are fast, and all the glands are fair and square with their respective rods, it is a very small matter compared with the answering of a report about a gland coming off, or the fire-bars melting with an ash-pan full of ashes, or a split-pin in the motion being lost, and delaying the train, inconveniencing a number of passengers. Not that engines may not break down, even after having been examined; but if they do, it is a source of satisfaction to know that the failure could not have been foreseen.

Once more. Many engines and vehicles are de-railed through the want of the most ordinary caution, which, like other acts, is followed by a fine. It takes two to throw an engine off—one to give the order, and the other to put steam on. Which is the biggest fool it is impossible to judge. All that is required to keep on the road—and reference is now made to engines about the shed-yard—is to perform the work mechanically, and it cannot be done without. It should be an understood thing that the driver before moving the engine should say to the man at the points, "Are the points right?" and he should answer, "They are right, if you are ready." This concerted action would be more intelligible than individual action. There is no doubt that, about a yard where there are many engines moving, it would be an excellent thing if the engines were fitted with bells, which could be so arranged as to sound the approach of an engine in the same way as a bell upon a velocipede warns a pedestrian. It would save many collisions and lives in more ways than one.

We have endeavoured in this chapter to point out the ways in which it is possible to go wrong, and also endeavoured to show how it is possible to go right—or rather, to try and go right; and, in conclusion, we shall show how it is possible to make an incredible mistake.

The driver of a goods-train brought his engine and train to the foot of a home-signal which was against him. He and his fireman had some difficulty in stopping at it; so the engine was reversed, and they sat down, and it is thought that they both went to sleep. The driver happened to open his eyes and saw the signal off, and put on steam. The guard in the rear finding that the train was going the wrong way, and gaining speed, and fearing some one would run into his van, jumped out and showed a red light, of which no notice was taken until the engine came up to him, when he saw that both men were standing facing the weather-board, and quite unconscious that they were going the wrong way.

The driver and fireman of an engine ran a distance of six miles on the wrong road, and crossed over into the other road, and had no sooner done so than an express went by them, which made their hair stand on end to think what a marvel*lous escape* they had had.

CHAPTER IX.

RUNAWAY ENGINES.

WITHOUT doubt it is a rare occurrence for a locomotive-engine to "bolt" out of the running-shed yard without either a driver or a fireman on the foot-plate. Without any driver? Yes. Without any fireman? Yes. With a train? No. It was a "light engine"—a phrase in railway circles that means an engine alone, without a train. The engine left the steam-shed whilst every man about the shed was in the engine-man's room at breakfast. After travelling about twenty miles it dashed into a parliamentary passenger-train at sixty miles an hour about eight o'clock on a summer's morning. The total number of passengers killed was seventeen, and about twenty-six were wounded severely, and thirty wounded slightly. The runaway engine cut up six carriages into match-wood, and overturned eight on their sides, before it was stopped; when it left the rails and lay on its side in the six-foot, the space between the up line and the down line. The accident was caused by a boy.

When a driver finishes his trip and returns home, he takes his engine to the coaling-stage, and he there leaves her, after having made a thorough examination of her machinery. If he is an indifferent engine-man, he will neglect this important examination, and postpone it until he is going out on the next trip, when he may find a broken driving-spring, as has been the case in hundreds of instances, when the result of his apathy turns home upon him. No spring can be prepared ready in order for him to take his own train out, and another man is called upon—with the pilot or bank engine—to run his train. But nothing of this kind occurred in connection with the bolting engine in question. It was examined, coaled, and put away by the turner—a responsible person whose duty it is to place the engines in their stalls, one behind the other; so that, commencing at the upper end of the rank, they follow each other out as they are wanted for the trains. If there are six engines in a row one behind the other, and the first one is required for the "Scotchman" at ten o'clock, the second should be ready, and is ready, in well-arranged sheds, to go out next, say, for the "Irishman" at 10.15. The third engine goes out at 10.30 for the mail; the fourth for the Manchester express at 10.45; the fifth for the Liverpool express at 11.0; and the sixth and last at 11.30 for the "Flying Dutchman;" and so with second expresses, and likewise with goods engines. If the order is otherwise, the irregularity is due to some unforeseeen cause.

The driver of the engine which bolted was booked on duty three-quarters of an hour before train-time—the usual practice. He left his home with his tin can and his dinner. The can would contain tea—drivers like tea; but they are fond of tea without milk. Milk goes sour. They are, as a rule, fond of sugar.

When they arrive at the shed they make straight for the lighting list, after they have booked on—a very simple matter. He gives in his name, say, William Wolstencroft, Limited, 12.30. Examining the lighting list, the driver finds the number of his engine and the number of "road" it is on. It happens sometimes that the sheds are named, as Abyssinia Shed, New England Shed, New Found Out Shed. If there are six roads in the first-named shed, the lighting list would inform the driver which of the six his engine was on. Of course his engine is in steam. All is done for him. The cleaner works all night, and wipes off all the dust and splashes accumulated during the last day's trip. The fire-lighter has lighted the fire in the furnace about two hours before the driver arrives. When the *engine-man* comes on duty, he comes to drive, and this only.

The driver of the runaway engine looked at the lighting list, and was directed by it to the shed and the road where his engine was supposed to be. He could not find *his* engine in steam; but he saw another engine on the same road in steam, which he thought was lit up for him in place of his own; but she was a nice beauty, and he knew too much about her, and when he walked by her he reverently said in his mind, "Good Lord, deliver us!" He was not blind to a good bit of machinery, nor proud, but he felt a kind of cold shudder take possession of him; he knew she had led many a man into hot water, and he knew that it was not always that a man came clean out of hot water. Her tubes would hold tight in the shed under the supervision of a foreman, but on the road her tubes would leak "like billyho." This was the result of bad staying. When the engine is in full steam with a train, everything about her is tested, and it happens under such tests that, if the engine has not been scientifically constructed, the expansion of the metals by heat would be unequally divided. The driver, after a fruitless effort to find his engine, turned along to the top of the shed, and went to the road in which engines are placed when ordered by the foreman to be stopped; but he found no engine like his. Seeing the nice beauty on the road where his own engine should have been found, he went to the lighting list again, and he found that *his own* was booked for him, and the deceitful engine with dry tubes in the shed, and wet tubes on the road, booked for another driver. Time was moving along, and when returning his watch to his little pocket, up came a pit-sweeper, an old familiar friend. "Have you seen my engine, old friend?" inquired the driver. "Yes," replied he. "I saw the engine-turner pulling her out of No. 4 in Abyssinia, and he was taking her towards the coal-stage. I have not seen her since; but the turner is in the 'glory-hole' —which means the engine-man's cabin—and he will direct you." The driver opened the "glory" cabin door, and hailed the turner. "Where is my engine, turner?"—"Your engine," replied the turner, "is in the coke-siding, in steam an hour ago." The driver knew the siding, and after shutting the cabin door, he proceeded there; but he met his fireman coming from that direction, with the information there was no engine in the coke-siding. "I can't find her, mate," said the fireman, "high nor low. So help me Bob, she must have bolted. I think old Harland, the turner, had better come and find her himself."—"Go and fetch him, Jim," said the driver, for he was of opinion with his fireman that they had run about quite enough.

The turner came, but having been disturbed at his breakfast he was not in the best of humours, and growled out to the engine-man and fireman, "Chaps, I think I had better carry you about a bit." "By the Lord Harry! my engine will carry me faster than you can. Where is she? I have, and my mate has, hunted this yard round, and we cannot find her, and if she is in this yard I'll eat my cap. I don't require carrying about; neither does my mate; but it strikes me, Harland, you have let her go; she is not here." "What nonsense you're talking," said the turner; "you engine-men, if you can't find your engine just where you expect her, you go on ever so. I put her in the coke-siding with another engine. She was rather short of steam, and I thought she would make steam there a little faster than being in the shed." This was no sooner said, than the coal-siding was clear to view, with no engine in it. It was impossible to form the slightest opinion as to who could have moved her whilst under the charge of the engine turner, and for the engine to go out of the coal-siding without the signal-man seeing her was impossible; and, therefore, all three went to the switchman's cabin. Harland led the way up the steps, and the driver followed. "Mac," said Harland, "you remember I put an engine in the coke-siding this morning, and came over the points again, and then went into the shed with the 'Belting Will,'—(name of an engine). Who fetched that engine out of the coke-siding?" "I can't tell you," answered Mac; "all I know is an engine went by my box, and she went down the main line. I was at breakfast. I thought somebody was taking her into the shed, but when she did not return, it struck *me somebody* was giving her a run to fill the boiler. But yet it was not a common procedure. My points were set for the main line, because the "parly" was gone, and I knew before anything came down the main line there would be several shunts to make at the coal-stage, so the points were open to the main line, but who was on her I cannot tell you. She is gone down the main line, that is a moral certainty." "She is gone, there can be no mistake, and, by the Holy Pope!" said Harland, "there is no one on her." "No one on her!" said the frantic Mac. "No one on her," replied the affrighted turner; "she's off, so help me God! she's off. There is no one about this shed that took her down the main line without my knowing something about it. Oh, she's gone right enough." Mac, the switchman, became alarmed, and his eyes rolled up and down the lines, until they ran counter with the figure of a telegraph-boy leaving the telegraph-office for the Running Shed. "Look, look, there is a telegraph-boy running towards the shed with a message." Harland and the driver fled down the cabin-stairs, and away across the yard towards the Locomotive Office, and there met the telegraph messenger in the doorway. Before they could speak, the boy, as would naturally be expected, was full of excitement. "There's an engine running away," said he; "passed Wellington at sixty miles an hour, and nobody on her." The facts were grasped as quick as lightning; the message had been sent by the station-master at Wellington to the station-master at the Locomotive depôt, who had sent it round to the Locomotive foreman, who was instantly on the spot. "What is to be done?" said the Traffic Agent to the Locomotive official. "Wire at once to Paradise Station," said the engine foreman, "and tell them to throw her off the road with some sleepers."

All followed instantly into the telegraph office. "Call Paradise at once, Gyp," said the Agent. The lad obeyed, and obtained the signal that Paradise was ready to receive a message. Wire—"Engine—ran—away—from—here—no—one—on—it—throw—her—off—the—road—with—sleepers." The message was no sooner taken than another was returned to this effect: "Your—message—too—late—engine—passed—

here—a—great—disaster—must—occur— the—market-train—just—in—front—of—her."

This message was received with mingled sorrow and disappointment, such as men can only feel who make a strong effort to avert what seems for the moment inevitable.

A dreadful accident happened that day, notwithstanding the swiftness of the telegraph. All that men could do was done; but onwards she flew, by the signal-cabins and stations, by quiet pools and churches, towards a living freight of men and women, to hurl them into eternity without notice, like the unfortunate train of passengers who went down from the top of the Tay Bridge into the boiling waters below. At a speed of sixty miles an hour, the runaway engine was seen by the station-master to round a curve in the line, a few hundred yards from the platform at which the market-train was stopping. On she came, and into the end of the train she drove, rolling into a heap of ruin, as quickly as lightning, a cargo of human beings —honest peasants. There was nothing to warn them of the coming danger. Hard work, and poor fare at home, had been the lot of many during the week, who sallied forth from their silver-sanded hearth with a basket of "sorts;" some with herbs, some with sweet-scented flowers, and some with fresh butter and new-laid eggs, surrounded with parsley. In a moment—in the twinkling of an eye—they were translated to the majority.

It was a dreadful affair, resulting in many sudden deaths and life-long wounds. Some had broken legs and broken heads, and their teeth literally knocked down their throats. How this lamentable accident happened will be seen. Without a moment's delay the station-master telegraphed to headquarters, and also for the tool-van—more generally known as the breakdown van, which was soon on the way towards the scene of the accident. Whilst the men were being mustered, Surgeon Spurram and others entered the van. On the way, the locomotive foreman endeavoured to form some opinion as to how the engine could have got away, and very soon he had, at least, *come to one* conclusion, and that was, that it was owing to the regulator being left open. He had found out that the boiler had been washed out over-night. He was right with respect to the washing out, but wrong—very far wrong—as to how the regulator came to be open whilst the engine was making steam. As soon as he arrived at the scene where so many precious lives had been sacrificed, the first thing was to release the bodies of the fated passengers. It is a matter of indifference whether the victims are rich or poor, the loss of friends is all the more poignant by its suddenness; and when sudden death meets our friends, we have a very strong desire to obtain possession of them as early as possible. We delude ourselves, or rather are deluded into the idea that they cannot possibly have "gone home," and the delusion is not banished until we see the tabernacle of clay in which their souls resided. The break-down gang, with the travelling crane, removed the telescoped carriages, and it was evident that all the passengers had been removed. Some were buried under the débris and not injured, others were terribly injured.

After the débris had been removed from the runaway engine, notes were made of every incident in connection with it; and then it was laid clear of the main line, for the time. It is usual in the case of an accident to try and get the up and down roads clear as soon as possible, so that an accident shall not incommode or delay other trains. However much passengers may sometimes be annoyed with delays, they may be certain that everything is being done under such circumstances which is both practical and expedient for their benefit. The débris of an accident is sometimes turned down an embankment in order to make the line clear for other trains, whereas if the disabled trucks had been carefully craned at the time some money would have been saved. If people only knew how much is done for their comfort upon a railway, they would never utter another word of fault-finding.

The locomotive foreman and his men having returned home, he was in a position, with the information now in his possession, to hold a kind of preliminary examination and scrape together a few straggling facts, which might fortuitously contribute towards arriving at the cause of this catastrophe, unparalleled in the history of railway accidents.

The driver stated that he brought the engine home overnight, and left her at the coal-stage with instruction to put 20 cwt. of slack and 10 cwt. of hard coal on the tender. He examined his engine thoroughly, as was his practice, outside and underneath, and he booked his engine "off" in the repair book as being "all right;" but the boiler was dirty, which caused the engine to prime, and he entered in the wash-out book "boiler water requires changing." The regulator was in good order, working freely and without any indications of leaking; had the regulator leaked it would have shown it when the engine was at rest with the cylinder-cocks open; the steam would have continued blowing through instead of simply clearing the cylinders. He further stated that he had only one opinion, and that was that the regulator must have been left open after the boiler had been filled up. There was no doubt about the regulator having been opened, because it was found open when the engine lay on her side.

The next to give evidence were the washing-out men. They stated that the boiler was reported to be washed out; and they blew the steam off as soon as the engine came into the shed, and let all the water out. She stood six hours, in order to gradually cool down altogether, then they filled the boiler again with water until the gauge-glass was two-thirds full, which was the usual height for filling up. One man could swear to closing the regulator, "because," said he, "there is no mistake about it, for I knocked off the 'bark' of my fingers when doing so, through the regulator handle coming in contact with the gauge-glass standard. People who make such regulators should have made brass men with brass hands to use them, for I am always knocking my fingers about with them." These men could not throw any light on the subject; in fact, the whole affair was becoming more and more shrouded in mystery. The next to give evidence was the turner, who stated that the engine in question had been booked over-night to have the *water changed,* and she was put away without being coaled, which was, as he knew, contrary to orders. But the rule had been departed from in order to comply with another rule, which was that no boiler was to be filled with cold water within six hours after having been blown off. The coal-shed was full of engines, and if this engine had remained to take her turn, the water would not have been changed, and he knew it required it, because the boiler was covered with priming marks. In the mornings, there is no trouble in taking an engine round to the stage and getting coal, because the men are not busy. At night some twenty or thirty engines are there, and it is all hard work; and not as if we had steam-cranes, by means of which we could 'wipe' the coal on to the tender. I took the engine round to the coal stage about seven o'clock. She had no steam, and I steamed her round with another engine, and after the men had coaled, I put her in the coal siding, and I am sure I put the break on."—"There is nothing so simple as following instructions," said the foreman, "and there is nothing so hard, which follows indirectly generally, as breaking them. If you had put this engine out of gear, this accident would not have happened, notwithstanding the regulator being left open. I will not say anything about the engine not being coaled over-night. Under the circumstances, it was better to observe the washing-out rule, and allow the boiler time to cool before filling it with water, than to carry out the order respecting coaling; still no engine should be put away without being coaled, watered, and turned ready for the next trip."—"Why did you not put the engine out of gear?" No answer. "And if you put the tender-brake hard on, how do you account for its being taken off?"—"The cleaner, sir," replied the turner, "was on the engine, and he may have taken it 'off.' I have not seen him to ask any questions."

George Goodheart, cleaner, stated that he cleaned the engine, and Bill Shotton helped. When one boy's engine is in the shed, and another lad is waiting for his to come home, they improve the time by helping each other; and they do it well. If, for instance, a lad wants to improve his time by cleaning for another, he takes some particular part, such as half the wheels, or he wipes the boiler. So there is no haggling afterwards as to how much was done by one or the other.

Sometimes a good lad will work for another and try to make his work shine, so that he can see his own likeness in it; whilst he may receive in return a dry wipe with no elbow-grease about it. Goodheart stated that Shotton cleaned half his engine-driving wheels, and he finished them at the coal stage. "Ask the turner to come in," said the Inspector. "I want," said he, addressing him, "to know if you know whether the engine-wheels were clean or only half clean."—"I don't, sir," answered the man; "I put her into the siding, and the cleaner said nothing to me about fixing her for wheels."—"Now, Goodheart, how did you manage to clean the other half of the wheels?"—"I pinched her with a bar," said he. Of course this explained how the break was taken off, and it showed that the lad did not put it on again. But still there was the ugly fact of the regulator being open. To Goodheart: "What did you do when the engine was taken to the coal siding."—"I held the points," said he, "and 'Ponto,' was on my engine."—"What do you think he was on your engine for?" asked the foreman.—"To 'cop' my waste, and steal my 'tommy.' He did not exactly steal; he left his bread and dripping and took my figgity-pie out of the dome."—"How do you know it was he, my lad?" inquired the foreman. —"Because, sir," he made a mistake in leaving his tommy-cloth, as well as his 'tommy.' I knew it because Bob Creek, the fire-lighter, the night before, ran a packing shover through his tommy and cloth, so I knew it was his. When I saw him on the engine, I ran to her as soon as I could, and asked him what he wanted. He said he had hid his tommy on my engine, and when I found his bread I took it to him, and he said to me before I could speak, his mother had made him such a nice pie, and he had just finished it, or he would have asked me to have a bit. I did not see him touch the regulator, but I have seen boys playing at drivers and firemen: if a dead *engine is being* drawn out of the shed, I have seen one lad *open the regulator* and the other stand by the break. They would sometimes pretend that there was a collision, and each would jump off or tumble back into the tender." To have asked the lad if he did this kind of thing would only have tempted him to tell an untruth; so that a good caution against doing such things was about the thing that could have been done. Ponto was asked for, but he was off duty. Goodheart went to his lodgings, and after knocking at the door, and obtaining an answer, Goodheart informed Mrs. Wilson that his foreman wanted Ponto. "Ponto is not here," answered his landlady. "What do they require with a waif like him at an inquiry for?"—"Only," remarked Goodheart, "to explain why he was on my engine when she was being taken round to the coal-stage, and to state why he stole my pie."—"Steal! why, dear dear, it would surprise you what he's stolen off me. It's awful. I'll lay my life he's bolted clear away, for as soon as he heard of the accident he was off. He's miles away by this time. Dear, dear, what a Turk, to be sure!"

Accordingly Goodheart returned with a verbatim account of his venture in search of Ponto. The lad's message had a crimson glare about it, for it looked very suspicious for the lad Ponto to be wanting at this important moment. "There is no doubt in my mind now on the subject," said the inspector; "the lad Ponto opened the regulator of the engine when it was being moved from the shed to the coal-stage, and he forgot to shut it. Call the coal-man in."—"From the evidence already obtained, we find that when this engine came to the coal-stage a lad named Ponto was on the foot-plate. Can you remember if that was so?" inquired the locomotive foreman. "It was, sir," answered the coal-man; "and I ordered him off, because he was blowing the water out of the gauge-glass; and I thought he might break a glass and scald himself. I have seen boys playing at drivers and firemen on dead engines which have been brought to the coal-stage; and I have thought before now that some day a regulator would be left open. I never mentioned it to any one; you see, we often have thoughts that appear at the time too ridiculous to entertain, or too dreadful to think of, and still they may very often become confirmed by facts. I had an idea once, and I told my foreman about it; but he said that when he wanted advice from a coal-man he could send for me. So I thought that quite good enough to last me my lifetime."—"What may you have suggested?" asked the inspector.—"Why I suggested this —that we should be paid by the ton, because, don't you see, when we are on at nights, we put up many a lot more coal than the day men; and it would come to their turn to work a night shift, as well as ours; and if we were paid by the ton, see what an encouragement it would be to get through the work. However, he said he had an idea too, and that was to put up a steam-crane—which he did, and not before it was required. After that he adopted my idea, and paid by the ton; but I was pretty well snubbed, I assure you, and never put myself forward from that day to this."

It was the opinion of the officials that the lad Ponto, whose conscience smote him, opened the regulator when he was on the engine, pretending to drive, and forgot to close it when he left the engine. But independent of that, if the turner had put the engine out of gear in the centre notch of the sector-plate, he would have carried out orders which time and experience have taught us. There can, no doubt, be certain acts performed by a thoroughly practical man, leading to results which the mere theorist has no conception of. In a running shed, a set of rules drawn up by a really practical engineer will do more for the public than tons of reporting. It is not every intellect that could, by abstract reasoning, see the connection between a boy on the foot-plate and a dreadful smash; but that there was the connection in the present case, no one can deny. So it is with all things. Buy common oil for lubrication, and you can see an engine with a hot axle giving up her train and throwing the running arrangements athwart. It is not always easy to see the connection between cause and effect, but when we see something which leads us to conclude what will be the likely effect, to make a note of it is a very wise plan; and to mark how close the relation is between what *did* happen, and what you anticipated would occur, is the only way to form an authoritative opinion.

CHAPTER X.

RUNAWAY TRAINS.

THE iron monarch is attached to the train, and the platform is full of people, high and low. The bell is ringing to remind travellers that it is just five minutes to departure time.

Everything is ready :—

> "The steam is up; the engine bright as gold;
> The fire-king echoes back the guard's shrill cry,.
> The roaring vapour shrieks out fierce and bold
> A moment—and like lightning on we fly."

There is joy in many faces amongst the passengers, and some traces of sorrow in others. Luxury and comfort await some, whilst to others, home is no home; but, whoever the passengers may be, all run at the same speed, and "the shepherd's crook is laid beside the sceptre," for the drivers are devoted to one object, and one only, and that is to carry them all to their destinations. To do this—and it is done with rare exceptions—the man in charge of the fire-king has to keep a vigilant eye upon his charge, and upon the traffic, and to maintain his self-possession. The work performed by our railway engine-men is well done. Sometimes it is performed under exceptional and trying circumstances, arising from the neglect of another, or from occurrences over which they have no control.

The express from the north was coming down a very long incline. As the driver came over the summit, he shut off steam earlier than usual, because it was a heavy train and would require more brake-power to keep it from attaining excessive speed. The brake was put on just to rub the wheels; but, the train gaining speed, the driver intimated with his hand that he required the brake on "harder." This was done by the obedient fireman. Still the speed gained. The driver took to the brake, but it was on hard, so he whistled for the guard to put his brake on hard—a signal which the guard understood, for which the driver makes sharp distinct whistles. Still the train gained speed. It is daylight, and the driver is satisfied that the guard is not asleep; he can see his head out of the window. Still she gains speed, and comes down the incline and round the sharp curves at a mad pace. The driver has put his engine out of gear; he has reversed her; but it is of no avail. At a distance of five miles ahead he is supposed to pull up at a passing station; for the line is single, and there he is timed to pass the south mail. To overshoot that platform may mean the wreck of both trains, as the mail may be just drawing into the platform at the same time as the north express, in ordinary conditions. The driver of the express knew that, and seeing it was hopeless to even dream of stopping at the station, he applied his whistle vigorously. The station-master heard the sharp, distinct, shrill sounds up amongst the rocks. By a kind of divination he interpreted the cause. As quick as thought, this agent jumped upon the back of a gentleman's horse outside the station, and in a snap he was off at a gallop through the little goods-yard, up the line for life and death, for the south mail had been announced from the next signal-station. The beast was urged along the six-foot, and the railway-man soon covered some level road for the north engine-man to pull up on. Amongst the hills, the steam from the south mail could be seen as a white cloud rising over the tops of the trees, and she was now right on the straight. The station-master and his horse attracted the driver's attention, and he instantly shut off steam, and passed him. The two engine-men stopped their trains without the engines touching each other. An accident was averted, and that by the station-master being a railway-man to the backbone. All is well that ends well; but this affair nearly ended badly, and through what? Fish. Yes; fish. A goods-train had been up the bank before the passenger-train came down, which contained putrified fish, the oil from which had run through the crevices in the floors of the waggons, and down the axle-irons and axle-boxes, upon the metals. Thus was annulled the frictional resistance on which the driver relied to hold the train down the incline. If the train had been fitted with continuous brakes, the margin of frictional power would have been sufficient, no doubt, to have held the train. But continuous brakes were not so much appreciated then as they are now.

Independent of exceptional cases like the above, some scores of accidents have happened by trains not having been under the control of the drivers. Engines have dashed into terminal stations and have jumped over the stop-buffer, whilst the engine-man was turning a somersault on the platform. The worst cases have occurred with goods-trains. At Dover something of this kind can be remembered, as well as at many other terminal stations.

Now, one source of the mischief is the allowing of the brake-screw to wear out before it is renewed; and as the driver seldom handles the brake—for it is not his duty—he sometimes forgets to make it his duty to examine it until it leads to his having to pay for a new set of stop-buffers, new engine buffer-plank, and compensation to passengers. The chances are that the firm—directors—are not an illiberal lot, and they give him, after having been suspended for a time, another chance to act on the impression that his buffer-beam is as glass, and that his brake-screw as precious as gold, and requires a vigilant eye upon it.

Another cause of overshooting the platform is the dependence of the driver upon the guard doing his share of the braking. This may be assumed at a roadside station, without incurring any risk to the passengers; but unlimited risk is incurred by trusting to the guard when the train is running into a terminus. Some of them have been seen to enter a terminal station sitting down to read the daily paper.

It is not in the power of any driver to know what the guard may be doing; and, therefore, in approaching a terminal station, the train should be thoroughly and entirely under his control, so that the engine may be able to stop the train, by signal, at any part of the station. Many accidents have occurred by the driver's assuming that the platform road was clear, whereas another train may have occupied half, and, to his horror, he has struck it.

If a driver is not thoroughly acquainted with a place, it is better to draw in under a little steam than to run in with the fireman looking into the sand-box with one eye and at the stop-buffers with the other. A train once ran away under very peculiar circumstances, illustrating the necessity for the guards being good railway-men. The driver of the train had gone nutting in a wood. He had obtained leave from the station-master, as the train would not be required for several hours; but before the driver returned it was required at the platform, and a guard went to the goods-yard for it. On the engine-foot-plate the fireman was asleep, and, by command of the guard, he brought the train to the platform. This was an hour before train-time. The guard dropped asleep in his van next to the engine, and the fireman went to sleep again on the foot-plate. When the guard awoke the train was travelling, and he jumped up, having no recollection of starting the train. He looked at the country about him, and, behold! he found the train was going in the opposite direction to that in which it should have gone. The man looked at the engine, and he could see no one on it. Could it be a dream? But, dream or no dream, he was travelling fast towards an open drawbridge. The jaws of death open to swallow him, he scrambled out of the van on to the step, and from there unto the tender, and shut off the regulator, landing the fireman a kick under the ribs, which shook him on to his pins. He jumped up and said, "Fire! Fire! where is the fire?" evidently dreaming, or the *kick had put fire* into him. The fireman and guard alone were with the train, and it is supposed the fireman must have moved the regulator in his sleep.

But, extraordinary as such incidents may appear, there are many others which surpass those which have been related. Not many years ago, the passengers who were waiting for a train, with baskets and bundles in hand, were surprised to see their train go by their station with both driver and fireman fast asleep on the foot-plate. The train proceeded onwards until the engine was short of breath, and it stopped on a bank which was too much for its strength. The guard, who was in the rear of the train, then jumped down from his van, and found the men in the arms of Morpheus. It is not in the power of any teacher to point to any particular kind of accident and preach upon the possibility of preventing it, and state confidently that such and such things have not occurred.

Now we might state that almost all kinds of accidents have happened. This may look like a wild statement. Have not collisions occurred by neglect of the driver? Have they not occurred by neglect of signalmen? Have not people been killed and then burned? Have not engines with their trains, with full steam on, met at a pace forty miles an hour? Was not the climax of accidents reached in the Tay Bridge, when engine, train, and passengers disappeared altogether, and not one left to tell the tale?

Trains have been stopped by the birds of the air and the beasts of the field; by the floods and by snow; and there is nothing new on a railway under the sun.

CHAPTER XI.

THE ROYAL TRAIN.

THE genius and worth of George Stephenson are felt throughout the world, not only by the subjects of Great Britain, but by the sovereign of the realm also, for whom, without the aid of the locomotive, life would not be half so enjoyable as it is. Looking back for half a century at the clumsy engine of that period, and then at the magnificent engines that grace the metals of the present day, the progress made in design and in speed, combined with safety, has no parallel in the history of inventions. The stupendous effects which, during so short a period, have resulted from the application of the steam-engine for running vehicles, are striking attestations of the value of the labours of those immortal engineers who stood by it when it was but a forlorn hope.

To an individual who gives us a poem, a picture, a book, or a new pleasure, or discovers a new country, the world shouts, "Live for ever!" Hark! a voice says, "Shakespere shall not die. Michael Angelo shall live. Stephenson shall be immortalised. Faraday is a 'Son of Light.'" All who have wrought at difficulties, brought order out of chaos, music out of discord, cannot analyse or account for the facile inspiration that led them along. All that they know is, that their work was there; and they cared not to look further into the matter.

We owe all the pleasure of quick travelling to a man whom, *at one time,* engineers, lawyers, and leading members of

Parliament were not ashamed to denounce as an idiot, and who blushed not to advise his consignment to Bedlam. Professing themselves wise, they became fools. What said the *Quarterly Review*, the mouthpiece of philosophy and literature? "Can anything be more palpably ridiculous than the prospect held out of locomotives travelling twice as fast as stage-coaches? We should as soon expect the people of Woolwich to suffer themselves to be fired off upon one of Congreve's ricochet rockets, as trust themselves to the mercy of such a machine going at such a rate. We will back old Father Thames against the Greenwich Railway for any sum. We trust that Parliament will, in all railways it may sanction, limit the speed to eight miles an hour, which is as great as can be ventured on with safety." This was in 1825.

What said *The Times* in 1875, just fifty years after? "Her Majesty Queen Victoria and suite left Windsor Castle for Balmoral last evening at eight o'clock, travelling by way of Bushbury, Carlisle, and the Waverley route, viâ Edinburgh, where her Majesty partook of breakfast, after which the train proceeded farther north to Perth, and by way of Dee-side to Ballater Station, where the train arrived at twelve o'clock." Now the distance is 600 miles, and deducting 15 minutes at Carlisle, changing engines, and 15 minutes at Edinburgh, and 30 minutes at Perth, the average speed is 40 miles per hour. So much for the opinion of writers who venture to reckon without the probable progress of all things in view. We have not only the speed that wise men thought proper to suggest should be the maximum allowed—eight miles an hour—but we run nowadays at a pace equal to the square of eight miles an hour. And, further, we not only work to the square of eight, but the passengers travel quite as safely at that speed as passengers did in the stage-coaches of which our grandfathers still delight to "crack" about. "Lor, bless you, they were a sort of glory in the country." "Jolly old coachmen, merry and fat, stuffed full of anecdotes. What features they had, and how they put the brandy and water out of sight! And what an odour of fresh hay there was about them! Nothing to equal it now."

This is all very natural; this passionate regret is expressed by Byron:—

"There is not a joy the world can give like that it takes away,
When the glow of early thought declines in feeling's dull decay.
'Tis not in youth's smooth cheek the blush alone which fades so fast,
But the tender bloom of heart is gone, ere youth itself is past."

Life on the King's highway has faded out—extinguished like some bright constellation gone for the night.

The iron horse on the iron highway has given us another and better life, which must be charming to many a man, woman, and child, and must promote human happiness, and tend to make life more bearable.

What is human happiness? Human happiness is to shake hands with your truest and best friends as often as you can, to spend your money together, to cut away, if you will, by yourself to scenes where the woodpeckers build.

"Place men," wrote Plato, "where they may breathe the air of congenial friendship, health and beauty, amid fair sights and harmonious sounds, and they will quickly drink in from surrounding objects sweet and harmonious influences." To carry out the idea of the philosopher, in ever so humble a degree, the railway service of the country offers every inducement to all classes, great or small in number, mighty or plebeian. To meet the demand of people who are constantly migrating in search of change—and we live by change—every precaution is taken to make railway travelling a success and a triumph over the various forms of the subtle decay which dogs the wheels of the rolling stock. Hence it is that we hear the wheel-examiner at the principal stations tapping the wheels to find out if there is a "dog" in it; that is, a flaw or a crack. Diligence is encouraged by the General Manager, who rewards the man with a half-sovereign who finds a "dog." Every engine and vehicle is examined every day; but when an engine is about to run the Royal Special Train, it is stopped for a day, and is put through a thorough inspection. When Driver Somerford came *off duty one* night, he found orders awaiting him to see the foreman the next morning. He knew what that signified. He was going to be asked a number of questions respecting the performance of his engine under steam with a train.

An engine may be all right, so far as working is concerned, and yet she may be a bad steamer for a long distance; and, on the other hand, an engine may be an excellent steamer under all sorts of conditions, and yet be badly managed; or it may be in the hands of a fidgety fogie, who would at every twenty miles during the run exclaim: "I think we shall do it," "I believe we shall!" "Upon my word we shall do it," and so on. Such men have no confidence when called to do a bit of bold enginemanship. In selecting an engine for the Royal Special Train, the driver also is to be considered. It is customary to choose the best engine and the best man. So, early the next morning, Somerford and his foreman were running over together the good and bad qualities of the engine told off for royal service.

The foreman was himself formerly a driver, and therefore a practical man, and could see what was required to be done to insure success. Besides, his advice was eminently practical and attentively listened to. It is a God-send to have a thoroughly practical man for a foreman, for where it is so there is less fining, less discontent, less changing of hands, less breakdowns, and less conceit and make-believe. Fancy a man being made a locomotive foreman who, to all intents and purposes, is a novice in locomotive driving, who cannot give advice but what is secondhand, who is simply an adept at manipulating figures, which he can make prove anything. But with locomotive engines it is a very different business. As soon as an engine and a driver are selected, they both make haste to get into the best of trim. The driver begins to trim the engine, and the driver's wife is as busy as two folks to trim Jim up as neat and as clean as a pink to drive the Queen. Jim's wife is all about amongst the neighbours. She calls in at Mrs. Goody's, and informs her she is very busy, and can't stop, for Jim is going to run the Queen. She pops into another neighbour's, and just mentions that Jim is at home; which generally brings out the question: "How is that?" "Oh! haven't you heard, Mrs. Smart? Our Jim is going to drive the Queen to-morrow, and he'll keep time, I'll back." The engine is placed over a convenient pit, near the top of the road, so that the officials can walk down the steps into the pit and examine the engine most minutely. In the first place, the regular cleaner is assisted by the "gang" of cleaners, that is recruits, who are elated not a little with the honour of cleaning her Majesty's engine. The feelings of loyalty work upon them, and the engine soon shines with "elbow-grease." At the same time, or just before, another gang of men, known as washers-out, set to and clean the boiler out, with hose pipes attached to the main and copper washing-out rods. The hose is first placed over the top of the fire-box, next in the chimney-end, and afterwards in each mud-hole or plug-hole in the bottom of the fire-box. After the boiler is thoroughly cleaned, which is known by the colour of the water running out of it, it is thoroughly examined with a spirit-lamp by the foreman of boiler-makers, who testifies as to its fitness to share in the performance of the trip. How minute the inspection is may be gathered from the fact that every bolt and nut is tested which holds the machinery together.

When the foreman inspects the engine he is accompanied by the driver, who gives an answer to any question which may be put him. The answers to these questions enable the foreman, from practical experience, to form an opinion of what is necessary to be done, in order to make success an absolute certainty. "How do the big-ends run, Somerford?" asks the official. "Very well, sir," replies the driver. "The trimmings are not very old, and I have examined them; they work very moderately, and when the siphon-cups are filled up, they will carry the engine a hundred and twenty miles. I am very particular about my trimmings, and it is necessary to change them as often as it is thought needful, because they get made up with gelatinous matter out of the oil, and I have found them in some engines as hard as corks, and just like pieces of india-rubber. But these big-ends of mine have not been hot for over twelve months, and then it was caused by the cranks striking a heap of ballast, which the plate layers had made too high to clear the engine. Some day or other these heaps of ballast will tear down the ash-pan, and it will be found inside a carriage. The engine runs on the whole very cool; the left-hand leading axle was a plague for a little while, but I had it lifted and the bearing reduced, and it is now running very cool. One of the tender axles was inclined to heat; but that was owing to the horn-plate stay being in the wrong place. The tender had been lifted for new brasses, and the stays were mixed up, and the bolt-holes not being quite fair the horn-plates were sprung in; and when the bolts were in their places the box was fast after a few miles' run. I took them all off one day at Coven, and put them in their proper places. I found they had each a place, and when they were in their own places the axle was free to work, and it has worked satisfactorily since; but before I discovered the cause the tender was a fearful plague. The wheels of the engine have shown no signs of shifting. I had her new out of the shop two years ago, and her wheels have been turned up since. The excentrics have not had the chill off them. I put plug-trimmings in them, like those in the big-ends and outside-rods, and they work very regularly and coolly. The pistons are steam-tight, as well as the valves. I have not had a hot slide-bar for a long time; the last was caused by the cranks hitting the ballast and throwing it all over the engine, when she became smothered with grit. She is in first-class order underneath."

Coming outside, in answer to further questions, the driver continued:—"She is a good steamer, and I have no difficulty with her, so long as the tubes are tight. At one time they were a great trouble; but since the tubes have been referruled they have been as tight as a bottle. I have no trouble with the steam. I instruct my fireman in the matter of firing, and I have my instructions carried out to the letter, or he would get pitched off the foot-plate. Some firemen waste more fuel than their heads are worth; but I always make it my duty to train my firemen, and I turn them off sharply if they are too cockish, and think they can strut and crow about my foot-plate.

"When I was a fireman we had no instructions given us, and if the engine began to blow off we used to put down the damper and open the fire-door. Some men never troubled about the damper, as the handle was placed at the front of the fire-box, so that you had to go round the hand-rail outside every time you wanted to alter it. Of course the cold air going in at the fire-hole made the tubes leak sometimes, but we could not be bothered going outside every now and then. Now we have all the handles quite convenient, and it is no trouble, though some drivers do just the same as before. We used to shovel the coals into the fire-box and allow them to roll anywhere. Now it is different; we have an authoritative opinion how to fire and when to fire, and it makes the iron horse go all the better—more pleasantly than formerly. Why, at one time we were always poking the fire, and the fire-irons were never out of the fire-box, and now many a man's fire-irons are his shovel and coal-hammer. I always work with a concave fire, and the coal in actual contact with the heating-surface and the principal mass of the coals over the fire-bar bearers and the centre of the fire self-feeding. The action of the blast and the shaking of the engine roll the lumps into the centre, and the grate is quite open and free from dirt. I am never troubled for steam if we get a strong head-wind or side-wind, which chops the air off the ash-pan front. I fire frequently, so as to keep the smoke out of the chimney, and leave it free for the exhaust-steam to escape. Under such circumstances, the exhaust-steam cannot ladle smoke out of the chimney without expending the power which should clear itself of the chimney-top. So, when the wind blows, I do with as little smoke as possible, so that the exhaust shall not be encumbered with additional work after leaving the cylinder.

"We have had the boiler washed out, all the glands seen to, the tubes cleaned, the fire-bars examined, and the lead-plug seen to."—"You think, then, Somerford, you are in good *trim to run* the 'Queen?'" asked his foreman. "Well, sir, I will try and give her Majesty a good run," replied Somerford. The polished beauty is all ready long before the fire is required to be lighted, while she is the heroine of the hour and the pride of the shed. Imagination is in full-play as the young cleaner and the young fireman gaze upon her. They fancy that in a few hours' time those huge wheels, under the control of Somerford, will be rushing in all their speed and mighty force by towns and sleeping villages, by pleasant homesteads and grand old churches, and on through hills and valleys, across rapid streams and swamps, out on to the level moors, and away, hidden in darkness, towards dear old Scotland.

This fiery courser has all the marks of "go" about her, and young hearts and young life can already hear her pounding through space and roaring over the rails.

At the appointed hour she is in steam, and stands foaming upon the iron track, impatient to be hitched on to the special. As soon as Her Majesty has arrived at the station, a very few minutes intervene before she gives the order to start, in the midst of the fullest excitement; for wherever the Queen goes, all is bustle and striving to see her face. English people like their Queen, and so the departure platform is always crowded whenever she is going away. A few clear, sonorous puffs, and the huge creature begins to stretch its sinews of brass and muscles of iron, saluting the weary cars in the sidings as it begins to feel the pressure of the load. When a driver has combined his knowledge of the signals and their position with his knowledge of the road and its gradients, he can then run with confidence, without the least fear of losing control over the train. With the special, there is, besides an inspector and a locomotive superintendent, a timekeeper who records the exact times at which the train passes stations. This man and the driver hold short but frequent intercourse, which enables the driver to regulate the speed, and to take the train by the stations just as it is due; and besides, it assists him to keep the proper distance between the pilot-engine and the train. The pilot-engine is run before the royal sngine, and it is supposed to have passed each station fifteen minutes before the special. After the pilot has passed, no engine or vehicle whatever must go over the same metals until the wheels of the royal engine and train have run over them. No shunting of carriages or waggons is allowed after the pilot has passed. The fifteen minutes is the Queen's. There is also a printed order issued to every station-master, signalman, and platelayer along the line of route, showing what time the special is expected to pass them in their respective districts, and, moreover, a circular is issued to all those drivers and firemen whose trains are to be on the route, informing them where to put in and shunt for the royal. Every one is deeply anxious to keep clear of this important train. Should any one by accident check or stop it, the poor wretch is soon deluged with letters, asking the reason why he came to make such a blunder. The greatest possible care is taken to insure success; and the royal is always travelling under the eye of the general manager, who is always in the train. As it passes along, the station-master and his staff are out upon the platform some time before she is due, to inspect all the crossing-gates in his district, and to appoint some one to watch that gate with all attention. The siding-points are spiked, so that any evil-disposed person or thoughtless servant could not possibly thwart the intention of the directors to run her Majesty under circumstances all tending to secure safety. A very select number of individuals who live in the neighbourhood of the stations are sometimes allowed to see the train pass. That is all they can see. The speed of the train renders it impossible to distinguish the Queen from another lady. All the provisions for security are worked out in the chief office days before the train is to go, and in the presence of those who are appointed to travel with the train. There must be no deviation from the appointed programme. The engine, bright as gold, in the hands of a skilful engineer soon settles down to her work, and, like lightning, on she speeds with the long trail of carriages sweeping round the curves, now full in view, awe-inspiring, now under ground, and now in the deep cutting, and then upon the level. But the good, noble creature is inseparably dependent upon the intellect of man which conceived him, and endowed him with strength to drag St. Paul's to Edinburgh if it could be hitched on. Thanks to the achievements of locomotive superintendents, we have at the present time the most magnificent engines in the world, and no one can become the driver of such without fearless toil. On the expresses we see men who have done wonders. From cleaning, at nights as well as day, to firing first on slow goods; from goods to fast meat-trains; from these to slow passenger, and on to the "goers." It is only after long experience that a driver is put in charge of the most important trains in the world. This is how it should be, to obtain the best men for the best service. A driver in charge of a royal train is as much at home as though he were running an ordinary express. The officials being on the foot-plate might hamper the fireman's movements, but not those of the driver's. He has his position, and there is not a locomotive superintendent in the world who would dictate to him as to his mode of using his engine, because the superintendent selects only such men as work their engines to his satisfaction. Therefore the trip is run under the most pleasant associations.

The Governor-General of Canada and Princess Louise had a narrow escape from a fearful death on the occasion of their recent journey by special train over the North Shore Railway from Ottawa to Quebec. Upon the day fixed for starting, and about ten o'clock in the morning of that day, a special train, comprising a locomotive and three cars, left Hull station, having on board her Royal Highness and the Marquis of Lorne and suite. Calumet, a station fifty-three miles from Ottawa, was to be the first stopping-place. About fifty miles from Ottawa is a small station called Montebello, and it was at this place that the miraculous escape of the Royal party, which we are about to chronicle, occurred. It appears the express train from Montreal to Ottawa was ordered to pass the vice-regal special at Montebello, and was to arrive there first and run in on the switch, in order that the special should not be stopped. The express arrived, ran up the main line beyond the switch, and backed down upon it. They had scarcely backed clear of the switch when the special was heard thundering along toward the station. The trainman, who had opened the switch to let the express back down, tried to close it again, when, to his dismay, he was unable to move it with the lever. He called for help, and no less than four men, aided with crowbars, were struggling to close it. On came the approaching train, and in a minute a horrible collision must have occurred. Those who saw the situation quailed with fear. Every one felt how utterly hepless they were to assist the men at the switch. The train was approaching at the rate of from thirty-five to forty miles an hour, the engine-man unconscious of the impending danger. At this critical moment a man rushed frantically up the track towards the incoming train, waving his arms wildly about. Without any signal-flag or other thing to indicate his purpose, it was doubtful if his gestures would be understood by the engineer, and if they were, whether the train could be stopped. As soon as the signal was noticed by the special driver, the brakes were applied, and everything done to stop the train; which, happily, was accomplished, but not until the engine had approached within a few yards of the switch. This shows the importance of keeping a good look-out.

CHAPTER XII.

THE DEATH OF DRIVER NATHAN GORDON.

THE trees and hedges were dressed in beautiful green, the meadows were covered with thick grass, and painted with the colour of buttercups and ladysmocks of silver-white, and cuckoo-buds of yellow hue. The orchards were displaying the silver blossoms of the apple, and the fresh scent of the lilac loaded the atmosphere. In the humble cottager's garden grew the gillies and daisies in the full glow of summer-time. The bright sunbeams flickered through the foliage of a dense oak-tree near the cottage, played among the soft shadows of Madge Elliott's brown hair, and darted with merry gleam across Nathan Gordon's dark eyes, which were looking into Madge's sweet face, as they had often done before; and he could not help thinking how beautiful his darling looked. She had filled her hair with crimson bramble leaves and bright holly-berries. Four years had passed lightly over their heads since they first had met, and Nat had lost his heart.

He had worked his way up through all the stages of the craft, and was now in charge of one of the fastest runners, attached to fast and important trains. He was handsome, true, brave, and merry. Some said he lacked such depth and earnestness of soul as Madge possessed; but, in her eyes, he was all she wished for. In the four years of their acquaintance, she had tossed aside her sewing hundreds of times to rush to her father's door to catch a glimpse of him as he passed on his iron steed, and to receive a missive of affection across the garden.

She could have been his wife before this time, but her sense of duty forbade her doing so. She had a father and two little brothers to look after, and her way was hidden. What could her little brothers do without her? and her father? Nothing. Her love for them was intense, and very beautiful in its unselfishness.

One brother grew sufficiently strong to go to work, and he went engine-cleaning; but, poor lad! he was soon killed. He went out one night with the break-down van and gang, and when they were lifting a cattle-waggon, it somehow was slung carelessly, and it fell on the boy, and killed him instantaneouly. Madge was almost broken-hearted at the loss of her favourite brother; but even in this dark hour, as she had done when her mother died, she roused herself to duty, and laid aside her own sorrow to comfort her only brother and her father. As all things come to those who wait, so in time Providence kept the solemn promise.

The only brother made up his mind to go to sea, and endure all the hardships and dangers of a sailor's life. Her father then resolved to marry again as soon as Madge was settled down, and so it became clear that her engagement was going to terminate as her heart wished for; and when they parted under the oak-tree, Madge gave the young driver a wealth of love from one of the purest and truest hearts that a bonnie English girl ever possessed. She was a brave girl, and her love for Nathan Gordon was sufficiently strong to bear the trial of leaving the hearth of her childhood, around which there were so many sacred associations.

Nathan's earthly ambition at one time was to become a driver—the whole and sole aim of his ambition. For this he pulled hard and long through winter and summer, as he knew there was no royal road to the regulator. If there was anything to be seen, he saw it; if there was anything to be read, he read it; and, during the day, when he was an engine-boy, he was stimulated in his arduous work with the ambition that, sooner or later, he should reach his aim.

What will the truly heroic spirit endure in the hope of reward? There are few things in life we should try to cultivate more than hope. Hope, not only as concerns the present, but hope for the future. Each possesses it just as much as each possesses the instinct of self-preservation, which has been termed the first law of nature. Without hope, the little cares and little troubles of little folks would crush them. Nathan came on to the foot-plate imbued with hope and familiar with hard work. He had something else—an ardent soul. He had not trodden the shed-floor and unheeded the work which firemen had to perform before starting away from the shed, and before being ready for a start. He was neither before nor after his time in anything, but he could do the thing at the right time and in the right way. His career as fireman was not tainted with false views. He knew his place by the side of his driver, and the outside of his life was read and known of all men. He pulled through the length of his shovelling term not for "siller" only; he was at the same time developing his mind, strengthening his character, and creating a tone of thought which would direct him right away from the meaningless, slipshod track. An inquisitive and inquiring spirit regulated his spare hours, and he maintained his superiority, ardour, and enthusiasm by drinking at the fountain-head of knowledge—scientific and literary journals.

By dint of courage and perseverance he made for himself a permanent character—staunch and towering. He became a driver, and discharged his important duties with skill, courage, tact, and courtesy.

Flaws he had in his foot-plate education, which he soon found out when he stepped to the chief's side of the fire-box and entered in charge. But he fairly estimated them, and winnowed the chaff from the true grain.

How often do we see young engine-men make a dead stop when they obtain an engine. As firemen they were seldom seen or heard, but as drivers they come in their true character to the fore, and positively make retrogressive steps. The reason is, that they have no standing of their own. So long as they were in leading-strings it was all right, but they tumbled to pieces when they were placed in charge.

To state that Nathan never lost time—to maintain that he never had a hot axle—would be to hold him up to derision. He was a model, but not perfection.

He had his anxious moments; he had his reports to answer; he had his little collisions; he was de-railed sometimes; he had his troubles with strange and new firemen and strange engines; but one thing he never had, a dirty engine foot-plate. No matter who came to fire for him, they felt that on that foot-plate there was a vital influence and not a dead letter. The power was contagious, and men were led to do things that they never were taught nor dreamed of doing for other drivers. They could see that all was done systematically and to the mark, and that on that engine there was a time for everything and a place for everything.

The work on the road under steam was performed as calmly as though they had been on the box of a family chaise. They were never short of steam; there was no running right up to a distant-signal, and then, finding it at danger, having to reverse and make a life-and-death effort to stop. Nathan was master of his iron steed, and he knew the road, the signals, and the traffic. This was not only seen by other men, but it was felt far and near, just as one does know somehow when a man is a master-workman. Nathan soon made a position, made a permanency, and made a little "siller" besides; and then his thoughts turned more than ever to Madge, whose heart he had won by his integrity, by his becoming modesty, mingled with self-respect. His countenance and demeanour told Madge that he was intellectually happy, but she was ready and willing to consummate his happiness; he knew that when they parted under the oak.

But before that could take place he had two more trips to make, after which he intended to give his bride an honest heart and a pretty home. The latter was fast being completed; the former had already been given.

When he went on duty in the evening after they had parted he met the engine-turner, who was fond of a joke, and good-humoured in his rough way. Probably he had an inkling of how matters stood with Nat and Madge, and the sly poke in Nat's side with the turner's big forefinger, accompanied by the upward drawing of the corners of the turner's mouth in a pleasant grin, and the merry twinkle of his dark eye, seem to imply the question which we are pretty sure is just about to issue from between his lips. "I say, mate, when's it to come off? Ha, ha! you know what I mean, Nat—this here trip on the connubial rail?" Nathan laughed at the joke and passed on.

He found his engine over the pit according to the lighting-list, and took charge of her; and, after having made the necessary examination, he left the shed, and then eventually joined his train, and in a very little time he was away.

The fields and their sweet wild flowers were basking in a radiance of golden splendour, the blue sky above reflected its heavy heat-clouds into the limpid streams by and underneath the railway, and down the hard iron road the air was loaded with summer fragrance.

Not a breath of wind disturbs the trees, not a rustle passes through them; on, by tiny dykes, broken-down fences, and miniature valleys, the iron monarch glides.

In the distance there is a rustic porch, and beneath its shade a woman stands with her hand over her eyes, peering into the brightness of the setting sun. It is Madge. She is standing on tip-toe with a smile of delight curving her lips, for she hears the sound of the express. The outline of the train is seen coming amongst the trees, and then Nathan appears in view with one hand holding the hand-rail of his engine, and the other is extended as engine-men do, meaning, "Here I am; I see you. How are you?" In his case it signified volumes. Ah! it signified farewell: "Good-bye; bless you." Poor Madge, may God give her grace! for he has gone—gone for ever. She returned in-doors, cleared the table of her sewing, and brought out some milk, and cut some bread and butter for her father, who soon after remarked, as a brilliant shower dashed against the window-panes, "What beautiful rain!" They were words never to be forgotten.

Nathan, meanwhile, was so far ahead as to be in the midst of the storm, which wetted the rails, causing his engine to slip her wheels, and to necessitate the use of sand, which was applied; but in order to see if it was running properly out of the sand-pipe, he leaned over the side of his engine, and was instantly struck dead. His head came in contact with the pillars which supported a bridge over the line. The train was stopped by the fireman, who, seeing his poor driver lying clear of the four-foot, put the train back to him, but he was gone! What remained of him was taken to the first station. The fatal wound was inflicted by the side of his head; clearly showing he was in the act of looking to see if his engine was working all right. The sad event was telegraphed to his foreman, who did as he had done many times before, devised the best means of breaking the intelligence to his father. Accordingly he sent for him, thinking that it being an unprecedented occurrence, it might suggest to him the idea of something being wrong, and it had the desired effect. The messenger knew enough to inform him that Nathan had fallen off his engine.

"I have a distressing message, Gordon," said the foreman, "to deliver to you, but God's grace can support you."—"Ah, it can; but, tell me, is my son alive?" The old man saw the tears in the foreman's eyes, and they were sufficient. Neither spoke for a few minutes, for both sobbed aloud: they had lost a friend indeed, and with his loss the sadness of the shadow of death fell upon them. "Yes, he's gone, Gordon," said the foreman.—"My son! my son!" Gordon exclaimed; and the poor, dear old man broke down with grief.

The foreman endeavoured to console him, and impressed upon him the importance of supporting his loss bravely. "For," said he, "you must arrange to go at once and see Madge, and when you are ready I will run you up the line on an engine; but I think you should lose no time in doing so, because it will soon be rumoured about, and she may hear of it. We are now face to face with our misfortune and loss; but I think *his intended* should know of it."

Madge had been down the lane leading from her father's to a farmhouse for milk and eggs; and from the lane she saw a small group of people at the station not far away. And stopping to notice them, she saw an old man in grief, surrounded by the station-master and porters, and she saw an engine. As the lightning flash, though immediately succeeded by the very blackness of darkness, lights up a scene more keenly than fifty summers, so the swift recognition of its being Nathan's father sufficed to realise to her all that she ever knew afterwards. But was not this really very much like tempering the wind to the shorn lamb? It was, and though there was an amount of uncertainty which prevented the flood-gates of grief being thrown wide open at once and bearing down all before it, she had a merciful warning of her bitter trial, and she, with a heavy heart and with a woman's instinct, exclaimed to her father as she entered the house, "Father, my Nathan is dead. I am sure of it." And she went and hid herself in her room. We need not describe any more. She could hear Nathan's father sobbing, and she could hear all her hopes were scattered at her feet like withered flowers.

We would if we could describe those hopes, but it baffles the power of the imagination and the pen. Poor Madge, through the long weary night that followed, kept her lowly and silent room, kneeling in an agony of grief, praying earnestly for strength to bear her bitter, bitter trial; strength to resign him who was the life of her life, the hope of her hopes; strength to brave the future which was now hidden; strength to bear her cross, which was the heaviest of all.

CHAPTER XIII.

THE TAY BRIDGE ACCIDENT.

THERE has been ever a sort of charm, both for poets and historians, in the associations attached to great works of human industry and invention, ever since Semiramis built the first bridge over the Euphrates.

The very name of Pontiff, ancient and eternal as it seems to be, was evidently derived from the custom of using the bridge as the most proper place for sacrificing to the gods.

The priests, accompanied by the vestal virgins, the prætors, and citizens, marched once a year in solemn procession to the centre of the bridge *pons Sublicius*, and there offered up sacrifices. The sanctity of the Sublician bridge was so great, in fact, that no repairs could ever be made in it without previous sacrifices of the most solemn kind, offered by the high priest himself. On one occasion the bridge gave way, and 200 enthusiasts were drowned. Throughout Italy beggars made the bridge their commonest haunt, and they were accustomed to run alongside carriages as they passed over, and to sit upon the parapets importuning the passengers. The most notable of all bridges as regards size and difficulty of construction is indisputably the great Trajan bridge across the Danube—a triumph of engineering skill, which in its way has hardly been surpassed even in modern times. Its fate remains a subject of doubt, and is the theme of an historic riddle which never can be solved. It is stated that the architect was put to death by Hadrian out of pure jealousy of the fame of the builder.

According to other accounts it was destroyed in consequence of a fear that the Dacians and other barbarians should use it as a ready means of access to the Imperial territories; and if this is the correct version of the vandalic act, it has been copied by almost every modern nation. The blowing-up of bridges has been a favourite operation for the military in all times.

In the Middle Ages, nearly every bridge had a castellated fortress at each end of it; and some bridges had a strong fortress in the centre. Others had square towers upon each of their piers, and the parapets were loop-holed so that the defenders could command the boats upon the river below. Many were the engineering difficulties which beset bridge-makers before iron came into general use; and those, one would have thought, were formidable enough without adding to them terrors of a superstitious kind.

Nothing, however, is more curious than the persistence with which, from the time of Ancus Martius downwards, supernatural influences have been held to rule the fate of bridges. There was a bridge which the Evil One watched day and night, as he had stipulated with the builder that he should have the soul of the first man who went over after it was finished; and to cheat the enemy of mankind a portion of the causeway was left unfinished. Those who have read Longfellow will remember that a similar story is reproduced at the Devil's Bridge in Switzerland, where "whatsoe'er was built by day, in the night was swept away by crags toppled from the precipice by the Devil's handiwork." The various devices by which the powers of darkness and the obstacles of a more material kind were gradually vanquished, confer great interest on the history of bridges. Many are the different structures in all parts of the world which now serve to illustrate the requirements of the times. Modern ingenuity has devised varieties enough of construction, material, and strength. The Bridge of Sighs at Venice. The Fribourg Bridge, 880 feet above the ravine, with its awful abyss below. There is the Britannia Bridge, so intimately associated with the name of the younger Stephenson, uniting the shores of North Wales and the Isle of Anglesea; it is one of the most gigantic structures of modern times. It is an iron tube, weighing 10,000 tons. The trains run through it. The length is 1,000 yards, and the greatest height above high-water mark is 240 feet. It is supported on three piers—two on the Carnarvon and Anglesea shores, and one on the rock in the centre of the Straits.

One of the grandest works in connection with railway engineering is the Victoria Bridge over the St. Lawrence, at Montreal, Canada. The superstructure is an iron tube like the Britannia Bridge, and its total weight is 9,044 tons.

These heavy and costly systems are splendid and brilliant achievements, and experience has taught us that they were even extremely economical pieces of engineering.

The viaduct across the valley of the Dee, in the Vale of Llangollen, is a wonderful structure. Its greatest height is 150 feet above the level of the river, and its length about one-third of a mile. It is supported by nineteen arches, and nearly the whole of the work is constructed of beautiful stone.

Want does all things:—Builds harbours, roads, canals, aqueducts, and viaducts. It builds lighthouses and breakwaters. It builds the locomotive engines of the present day. No doubt we keep moving onwards, whether we will have it so or not. It cannot be denied that, independent of the names with which each achievement is associated, we are advancing towards an unknown condition of things. But if we analyze all the forms of improvements, we shall find between the lines the traces of anguish and marks of the scorching tear—in a marked degree in the history of iron and engineering. To attribute to iron absolute indestructibility is a fallacy, though nothing is more common than to do so. Its liability to be influenced by variations of temperature, expanding or contracting, is in engineering circles well known; but the treacherousness of iron is awful unless a wide margin of safety is allowed for straining and crushing. One of the most gigantic undertakings of modern times is the bridge over the Tay, constructed in order to secure for the North British Railway Company independent access to Dundee, free from the control of any other company, and free from the inconvenience of a ferry.

In November, 1864, the first plan for a bridge was brought forward, but the design was objected to by the harbour trustees of Dundee, who considered that ships would run against it. Another bridge, at a place lower down, was proposed in 1866. That design fell through for want of cash. In the year 1870, a select committee of the House of Commons sat to inquire into the petition of the North British Railway to construct the Tay Bridge, when the preamble was declared fully proved, and the Bill afterwards came before the House of Lords, where a committee sat, and received evidence of a voluminous character, after which permission to build the bridge, according to the plans exhibited, was given.

The bridge was 3,458 yards in length, and consisted of 85 spans: fifteen of 120 feet; thirteen of 145 feet; thirteen of 245 feet; twelve of 130 feet; twenty-five of 67 feet; one of 170 feet; and six of 27 feet. There were used in its construction, 3,600 tons of wrought-iron, 2,600 tons of cast-iron, 35,000 cubic yards of brick-work, and 87,845 cubic feet of timber. In the middle of the river, the thirteen spans of 245 feet wide, were about 100 feet above low-water level, to allow vessels of large size to pass up and down the river. It was of a pier and lattice construction, carrying a single line of rails, having continuous check-rails throughout. The nearest European example of pier-construction similar to the Tay Bridge, is the Cere Viaduct, in France. It is a single-line viaduct, having piers in clustered column about 100 feet high, and 30 feet wide at the base.

The natural difficulties opposed to the construction of the undertaking at Dundee excited very great interest; and the fame of the noble example of man's skill and ingenuity went far and wide. It was visited by engineers from America, France, and Germany. Some went home and wrote about it; others thought more and said nothing. But, as a bridge, it eclipsed the magnificent structures over the Tamar, at Saltash, as well as the astonishing bridge over the Hollandsche Diep, It was opened in 1878, after having been tested with a downward pressure by running six heavy goods-engines over it to and fro. Of course the side or lateral pressure required to blow it over was a matter of calculation, and was stated to be 96 lbs. pressure per square foot, with a train upon it.

The summer passed, and the autumn died, and December raved for a death-roll. It made one in a hurricane of snow at Abbots Ripton; it had another in a gripping frost at Oxford, and the rapid fall of the barometer indicated mischief brewing in the Tay. The waves were crested with foam, the night was wild, the windows of the houses chattered again, whilst the fury of the swirly gale increased in depth and strength. The Edinburgh driver drew up at the south-end cabin, and received the baton from the signalman, proving to him that the line was clear; and it was not for him to ask more, it was his to obey, and cross with the living freight in that terrible night. Neither he nor his fireman was timorous. They pulled gently away from the cabin, and entered into the raging jaws of the storm. As they advanced it seemed as if the elements were let loose and battling together in fearful antagonism. The wheels and axles groaned against the rails, and flashing sparks shot out from amongst them, as the engine strained every nerve to cross the bridge. The ruthless, wild blast was fiercely sweeping clean across their track; the roar increased, and flash followed flash. The wind in its mad career swept down the Tay from the flat plain of the Carse of Gowrie, and the bridge of Earn.

"Huge uproar lords it wide, the clouds commix'd
With stars and moon swift gliding, sweep along the sky;
All nature reels. Destruction hastens."

The bridge repelled the gale until the unfortunate train entered the high girders, 100 feet above the waters; when the furious blast, as though eager for a banquet of slaughter, put forth all its strength, and at one fell swoop hurled girders, and train, and living freight, as one mass into the sea. No pen can *adequately* describe the terrible fall of iron, of steel, of fire, of hissing steam, and of the unfortunate victims. Short as the agony of Mitchell and Marshall may have been, there was a portion of time in which they would realise their dreadful situation more than any person in the train.

When one considers the stupendous character of the gap that was made (1,000 yards), the enormous height of the bridge, and the amount of metal that fell, together with a monster engine and tender, and a complete train with sixty passengers, one can form some idea of the tremendous accident, and one can also conceive what a night it must have been for the roar of the wind to have hushed all in a watery grave, without a single being on shore hearing anything of it. And so the bridge on which we all looked with pride, and had come to regard as a part of the great thoroughfare of this great community, was swept away under the tremendous side-pressure of wind. The train came into the central part when the pressure was scarcely sufficient to blow the bridge over; the train caught the wind still more, when the bridge capsized. After the train left the south end, the signalman telegraphed to the north end by a bell-signal to indicate that the train was on the bridge; after which he made an entry of the fact in a book kept for that purpose. By the side of the cabin-door stood a platelayer watching the train across the bridge, when suddenly he saw a great flash of fire and the tail-lights disappear. At first the signalman thought that the lights disappeared round the curve in the bridge, and he watched to see if they would come into view again when descending the incline at the north end. As they did not come in view, the signalman tried to ring the signal-bell in the north-end cabin, but he could get no answer. He tried the speaking instruments, and found the communication severed. He and the platelayer were astounded; but after they had collected themselves they walked along the bridge a "wee bit," but the night was so rough that they retraced their steps. "The wind was whistling." They went down to the shore on the east side, and below the bridge; it was dark, and nothing could be heard but the ruthless wind. They went east and went west, but they discovered nothing.

The moon was flitting about behind clouds, and ultimately she gave them a glimpse of the awful gap, and then withdrew behind a frowning cloud. They had seen the truth. They were struck with the majesty of the catastrophe, and went to Newport and told the people there what they had seen. The consternation and awe spread from house to house like wild-fire. The signalman in the north-end cabin, when he came on duty for the night, found the weather "blowy." It gradually increased to a hurricane, shaking his caboose, and carrying away chimney cans. He could hear nothing outside but the howling wind, when he received the signal from the south cabin that the train was on the bridge, and in a few minutes afterwards he expected it to pass his box, for which purpose he kept the line clear. He had waited nine minutes, when he began to wonder at its non-appearance. He then went to the top of the cabin stairs, or landing, and looked south for it, and could see nothing of it. All this time the wind was blowing in gusts. He tried to speak with the south signalman on the instruments, and also by bell; but, receiving no answer, he became dreadfully anxious, and went on to the cabin landing again. He could not see anything but the elements battling together. At that moment he was informed by some people who were walking along the esplanade that the bridge had gone. He left the cabin, full of fear and apprehension, and communicated what he had heard to the locomotive foreman, Mr. James Roberts, who was hard by in the engine-shed assisting his men to barricade and secure the doors. He and Mr. Smith, the station-master, made up their minds to go along the bridge in search of the train, notwithstanding the personal risk, for their great anxiety urged them along to see and know, as responsible officers of the railway company, the full extent of what turned out to be a great and unprecedented accident. It was dark, the moon being shaded now and again. As they proceeded they saw a red light on the south side, and at first they had hopes of the train being safe, for they could not realise *the fact that* such a dreadful accident was possible as for the *whole train* to have fallen into the river. They thought the communication had been broken through some telegraph poles having been blown down. But what must Mr. Roberts have thought and felt when he found himself suddenly on the very edge of the gap, and saw the water rushing out of the service-pipe and falling 100 feet down into the boiling waters below, which were then heaving and tossing over the dead, for whom no hearts were yet stricken? There was no noise distinguishable from the roar of the tempest to tell him what the wild waves held; neither did he suspect, with the light shining ahead, that the whole train with its living burden of passengers were engulphed in the billowy flood beneath his feet. Being satisfied as to the fate of the bridge, from the line he went on board a steamer, and saw from the river the full extent of the gap above, after which the notion of the train being on the south side vanished for ever. There was not a single thing to be seen to prove that the train was in the river; but all doubt was by this time dispelled, because they had had information of its leaving the south box, and abundance of evidence to prove that something of an unusual nature had occurred accompanied by continuous flashes of fire. An eye-witness stated at the inquiry that he came out of his house about seven o'clock to see the storm and its effects. The wind at the time was blowing the water into foam, the river was running very high, and the spray was dashing over the north end of the bridge. When within three hundred yards of it, he stood and looked towards it with the view of observing how the structure stood the storm. Almost instantly, he saw a mass of fire fall from the bridge into the river on the east side. The moon was shining out at the time, and was occasionally obscured by clouds, whilst the wind was severe. When he saw the mass of fire fall, he exclaimed to a friend who was with him, "There's the train in the river." He looked to the river to see if he could see anything, and he thought he saw steam or spray rise near the north end of the big pillars. There was nothing to be heard when the body of fire fell, but the howling tempest. He was alarmed, and climbed over the fence of the Caledonian Railway, and shouted to the North British signalman; but what with the wind and the water, he had some difficulty in gaining his attention. Having succeeded, he asked him if the Edinburgh train was on the bridge, and the signalman replied "The Edinburgh train has been signalled ten to fifteen minutes." Then, answered the observer, "I think the train is in the river." Whereupon Mr. Roberts was informed of the matter.

We have endeavoured to give a succinct account of this catastrophe, which is destined, as long as railways exist, to hold an unenviable place in the history of railway accidents; for, properly speaking, no eye saw it and no ear heard it, and no one survived to tell anything about it; and of sixty-seven persons who went down on that fatal night, the bodies of only forty-five have been recovered.

The engine, No. 224, was a bogey engine—an engine of which the forepart is supported on a carriage running on four wheels, for the purpose of facilitating the motion of the engine on curves, and making a smooth-running engine. The driving wheels were 6 feet 6 inches in diameter, and coupled; the cylinders were 17 inches in diameter, with a stroke of 24 inches. It was built by the railway company in 1871, at Cowlairs workshops, and was fitted with a Westinghouse brake and two hand-brakes. The weight of the engine was 34 tons, and the tender, with fuel and water, weighed 24 tons.

In the sad fate of Driver Mitchell and Fireman Marshall we have a graphic illustration of the contingencies of locomotive driving. These men left their homes on the morning of December 28, 1879, never to return again. We find that they managed their engine in every way satisfactorily; and they never felt themselves more capable of conducting their work as well as they did when they set out on this fatal trip.

Before they reached the bridge they had experience of the gale, and it formed a portion of the last conversation which the fireman had with his father a few stations before reaching the Tay Bridge.

Marshall's father came to the station to see his son, and something prompted him to ask them if they were not afraid to be out in such a dreadful night, but they both replied that was nothing when they were used to it. They spoke from experience, and no doubt they had felt before as much wind blowing; and so far as their engine was concerned, they knew they could pull through it, but there their responsibility began and ended. They had no voice nor control over the bridge. It had been erected by eminent engineers of the day, to extend the interests of the railway company by whom they were employed; and, therefore, they would be the last of men to hesitate in crossing it at any time. It was their duty to judge when their engine was not safe, and they would confide in the like quality being possessed by those whose duty it was to say "nay" to crossing the bridge. When we hear of men losing their lives by neglect of their own, we feel that an error has been made which cannot be redeemed; but when men lose their lives in the execution of their duty, we feel how strangely contradictory are human judgments; and the outcome is commiserative feelings for those who laid down their lives for *us*—teaching us that our calculations were wrong, to show us the flaws in the links of our scientific knowledge.

From the Queen down to the humblest of her subjects all felt sorrowful when they heard that a train had left Edinburgh for Dundee, and that on Tay Bridge a tragedy occurred such as never had taken place in this country. There was lamentation, and mourning, and woe. "Please, sir," said an inquirer, to a person coming from the direction of the station, "can you inform me if the Edinburgh train has arrived?"—"The Edinburgh train, madam, is in the river," replied the man. The fluttering, anxious heart of Mrs. Mitchell gave way, for she had been watching for her husband's return, and she became unconscious. Before any one knew positively that the train was lost, she became anxious, and was therefore making inquiries of passers-by.

Driver Mitchell commenced cleaning engines early in 1864, was made a fireman in 1865, and was promoted to the position of a driver in 1871. So, he had been driving eight years. He was thirty-eight years of age. Mrs. Mitchell was left to mourn his loss with five children, of whom the eldest was under eight.

Fireman Marshall commenced cleaning in 1875, and was made a fireman in the end of the following year. So he had been firing three years. He was not married.

As some persons may be interested to know how the engine and tender were lifted from the bed of the river, it may be stated that the "Henry" was fitted up with horns over the bows, and with strong tackle. After the chains had been made fast below, by divers, they were gradually raised to the surface by means of winches worked by small engines. In connection with the "Henry" there is a little history which shows that the chequered story of accidents is not confined to bridges or railways. The "Henry," built and belonging to Shields, was wrecked on the Island of Lewis some 45 years ago when she was seven years old. Mr. Birnie bought and raised the wreck, and brought her to Montrose, where she was fitted up, and ran between Montrose and Quebec for many years. She afterwards served in the Baltic and the Quebec timber trade.

CHAPTER XIV.

LAST TRIPS.

WHATEVER has been done to make railway travelling safer has conduced to the comfort and safety of engine-drivers. But, notwithstanding such facts, we find in engine-driving life many chapters of melancholy catastrophes, tales of matchless danger, and instances of sharp but sudden sacrifices of life.

There are not more than two or three accidents exactly alike in all particulars; which is an assurance that no accidents happen but the officials put in action counteracting means to prevent their being repeated. Still we find some new foe dogging the wheels of our trains, never satisfied without a funeral pile.

Truly we pay for our railway experience with life, dear life. There is scarcely an improvement which has not been brought about by suffering and death; and the dreadful thirst for victims is as keen as ever. Not all the combined wisdom and sagacity of scientific men can grapple with the Hydra-headed victor. Cut down and disarmed to-day in the east, it springs up again in the west, and new victims fall, never to rise. Art, with all its life-saving apparatus and its plans of improvements, is engaged upon the accomplishment of the great work of emancipating our engine-men from accidents; still these happen.

Every accident that occurs is investigated with minuteness, and the circumstances are recorded with painstaking care, by trained experts and writers. Still they happen. Plans without regard to expense or labour are prepared for the inquiry. Officials of the Board of Trade, with ability of the most ponderous description, investigate every case. Still they happen. Government, with public interests and life, precious life, to support it, grapples resolutely with cases, and the truth is shaken out in a manner which could only be done by professors in the art of sifting truth from falsehood—golden grain from subtle chaff. Still they happen. Patient and indifferent to time, the task assigned the inspectors is performed in integrity of purpose and intensity of earnestness to a degree which proclaims each investigation as perfect and as efficiently performed as human ingenuity can make it. And still, from the nature of machinery and from human fallibility, they happen.

A driver and fireman may get through the first and second stages of a trip, or may have travelled for thousands of miles, and yet drivers and firemen are often plunged into eternity without notice. Force to force opposed, the engine is hurled from the track over the embankment, burying him who a moment before held the regulator in the pride of manhood and health. Not all the gigantic brains, energy, and iron will of individuals can contend against natural laws.

Are we perfect? No. What are the facts? Boiler-work has advanced to such a degree that an explosion is of very rare occurrence. Have not wheel-fastening and wheel-making received incessant attention? Has not the whole system of signalling been improved by "blocking" and by fixing signals where engine-men can see them early, and not, as formerly, planted so obscurely as to compel men to strain their eyes out to see them? Look at the block system, which controls the railways, and affords the means of working a heavy and quick passenger traffic. Still, mishaps follow the wheels like bloodhounds, and accidents, to which men, with innate foresight and acquired skill can, by incalculable knowledge in their heads, contribute nothing, not an atom, until the victim is slain, a grief to all, a triumph to the foe. We shall briefly follow one through his career—as good an engine-man as ever took charge.

From tending "nibbling sheep," and reposing on a bed of blossoming heath, he obtained a berth in the running-shed. He was the only child of his mother, and she a widow. After he had obtained a doctor's certificate certifying that his health was good, he entered the railway service as a cleaner. He possessed an inquiring spirit, and gave no little attention to all questions connected with the locomotive. His education had been curtailed by the cruel hand of fate. Toil cast its sombre shadow over his young heart ere it had felt the sunshine of a dozen summers, but he broke his bread with simplicity, and pulled hard with his mother through the cold winters, in wind and in rain, amid many vicissitudes. His stock of books was very limited—"Robinson Crusoe," "Belisarius," "The Wide Wide World," "Life of Wellington," "Young's Night Thoughts"—from these he wrested their meaning. He knew nothing of grammar until he accidentally picked up a copy of "Cobbett's Grammar" at a fair, from a book-stall where the owner was clearing out, and refusing no reasonable price. That book was a precious treasure, and he chewed its contents until he knew what savoury was required to make a palatable literary pasty. He sold a couple of rabbits, and walked twenty miles to buy a second-hand Johnson's dictionary, which cost every penny he had in the world; but he was happier than a king. His library was contracted, to be sure, so were his means; but he knew that as he grew older his means would improve and his book-shelves look fatter; so towards manhood he grew, gentle, pure, honest, and brave.

He went through all the hardships of a cleaner's life, drank his warmed-up tea in the furnace-hole, and without a murmur partook of what He who feeds sparrows had given him.

After passing through the grade of a fireman, first on goods, and then on passenger-trains, he became an engine-man; and but few men took possession of the regulator having such a fund of locomotive experience. He let nothing slip—not a bit: if there was a cylinder-cover off, he would seize the opportunity of examining the cylinder; if a dome-joint was broken, he would look into the boiler with a keen relish; if the safety-valves were out, he would examine them, and find out the meaning of flat-face and mitre valves. He would assist in putting together a big-end, in making a trimming, in lifting an engine, in taking down the excentric-rods to lengthen them or shorten them, as the case might be; and, when the fitter was setting valves, he would assist to pinch the engine for him. In a word, he worked his brains as well as his muscles. Whosoever you are that have wits enough to discover the philosophy of such a spirit of inquiry, go and do likewise. Without such attention no man can become a locomotive engine-man of repute. There was another good feature in his character rarely to be met with, and that was, he was never plagued with an overwhelming sense of self. He knew nothing of the ignorance and prejudices that led others to roll themselves up in conceited notions, which is as grave a fallacy as the one entertained by the ostrich, which hides its head in a bush and thinks its whole body is secure. As for our engineer, all the mysterious demonstrations of locomotive science he had examined, and he was simple-hearted enough to think and believe *all* other engine-men were likewise in full cry; and that whatever he had hunted down and unearthed and obtained the mastery of, it was *there* for others to enjoy, not for a day, but for a life. Men knew this. They could approach him; and to the younger hands he was a giant that removed obstacles which they found in the study of steam and steam-engines; and the liberality with which he spared his own for their sake made him, in their eyes, intellectually a head and shoulders higher than his mate. He never turned a lad away without feasting him with bits of good engineering.

> "A breath of encouragement sends round the mill;
> A breeze of disparagement makes it stand still."

He was always the same. As an engine-man he had no equal; he had a master-passion for the iron steed, and nothing ever happened to him but of which he could divine the cause, as it were, by instinct. It is idle to deny this gift. Some men cannot grasp a locomotive difficulty instantly, and shake the truth out of it, without a deal of pressure being brought to bear upon them; whilst there are men who with half an eye can see at a glance the complaint. In a word, some men —chips in milk—will actually deem a strain or a break-down unassignable; another will diagnose the complaint and prescribe the remedy. Such insight can only be acquired by painful labour and hard-earned experience, supported by the love of the subject. By close observation, either on the foot-plate or on the framing, by constantly listening to the *sound* of the beat, the ear is trained, as in music, to detect the slightest discord or irregularity. But it is evident that a man, if he wishes to become a *master workman*, must study diligently to be *always* prepared to act with precision in an emergency. Having broken down, the first thing we ask is, "What is it?" Many an engine-man has been in a fog to try and find an answer to that question with a reasonable degree of readiness. On the day of our friend's death, a young engine-man stopped him as he was crossing the steam-shed towards his engine—for the last time—to ask a few important questions on the subject of break-downs. The young man knew he should get a few tips, and he was not far wrong in his estimation of character.

Taking the inquirer to an engine, and looking at the motion, "Suppose," said he, "that the right-hand spindle was to break outside the gland under steam with an express, and you were fifty miles away from any assistance, and supposing that daylight was in your favour, how would you go to work to pull your engine up again?"—"I should," replied the anxious inquirer, "disconnect the excentric-rods, and take down the right-hand engine, block the piston against the back cover, and put the valve over the ports."—"That," answered the engine-man, "would take you half an hour. Now with this engine you can pick her up in five minutes. You see the valve-spindle connecting-rod is suspended by a link from the boiler, and if you disconnect it from the link, and also from the valve-spindle, you can tie it up; raise it so that although it is worked to and fro by the excentric, it performs no useful action. You can then place the valve over the port, with the cylinder-cocks open. Suppose the slide-valve is right back against the glands, if a little steam is allowed to blow into the cylinder through the regulator-valve it will escape through the cylinder-cocks into the atmosphere; you must then push the valve towards the front until the escaping steam is stopped, then you know both ports are closed; fasten the spindle there by screwing the gland down upon the spindle, and off you go. It should be done in from five to eight minutes. Suppose, in an engine having a swing motion, that is, one suspended from the boiler, a connecting-rod was to break and knock the cylinder-end out, how would you act then?"—"Take the big-end down, disconnect the valve, and put it over the ports with a little steam on," replied the young engineer.—"Yes. If," said the elder engineer, "an outside connecting-rod of a coupled or goods-engine were to break, what should you do?"—"I should take both sides down," answered the pupil.—"Do you know," asked the teacher, "how to try the valves and pistons to test them for wear and leaking?"—"I know one way; but I have heard," said the young man, "that there is a way of testing them without moving the engine; according to the way I have been taught we have to move the engine to test both cylinders."—"To test an engine for worn valves and piston-rings, I can explain it best with my own engine. If you will come with me I will show you." Our friend took him to his engine and placed both little-ends opposite each other, near the spectacle-plate, and then drew his attention to the position of the big-ends; one was between the top-centre and back dead-centre, the other was between the back dead-centre and the bottom-centre. "When the brake is put on hard, and a little steam is admitted through the regulator to the cylinder with the lever full over, that will test the right-hand piston; and if the lever is pulled right back into back-gear, that will test the left-hand piston; and when the lever is placed in the centre notch of the sector-plate, that will test the valves. But, mind you, there are right and left-hand engines. When both little-ends are opposite each other near to the spectacle-plate, and the right-hand big-end is above the left-hand one, the right-hand cylinder is *tested* first with the lever full over; but if the left-hand big-end is above the right-hand one, she is a left-handed engine, and the lever full over then tests the left-hand cylinder first, and the right-hand cylinder is tested with the lever in back-gear. With either engine, right or left, with the little-ends opposite each other, the valves should close the steam ports when the engine is out of gear. I will explain something else to you now, as we have the engine set in this position," said the fated man, for he was fated to die in a very few hours. "If we were to take the steam-chest cover off, we should find the back steam-port uncovered to the cylinder. This is a right-hand engine, and the front port is uncovered to the cavity in the slide-valve, which is open to the exhaust. If you were to drop a piece of tallow down the exhaust-pipe with the engine in this position it would enter the cylinder, and such a thing is often done when a grease-cup is out of order. So, when steam is put on, if the piston-rings are defective, it blows by the piston, and, after passing along the cylinder, it enters the front port into the cavity of the valve, and up the exhaust-pipe, into the chimney, and out at the top, where it is to be seen. If the rings are tight, no steam escapes. On the other side, left-hand, the steam-port is closed; but if you reverse the engine, you open the left-hand back port and close the right-hand one, and all the conditions are transferred from one cylinder to the other. With the lever in the centre, all the steam-ports are closed, but the position of the valve over the ports is such as will allow any steam entering the cylinder to blow through into the chimney. I will explain another thing to you. ' Bring the engine ahead, mate," said he to his fireman. When he had fixed the engine on the front dead-centre he explained the meaning of *lead*. "Now, with the engine in that position, the valve has already uncovered the steam-port, and steam is admitted slightly before the stroke is finished. The steam acts as a kind of cushion for the piston when changing its motion from a back to a front stroke, and *vice versâ*. It is also there in the cylinder, ready to urge the piston ahead. If an engine has no lead worth speaking about, she is 'blind,' and will not get away from a station.

Now, lap answers this purpose, when the piston has traversed a portion of the stroke, the steam is cut off by the valve, but the valve is not open to the exhaust, because the valve-face is wider than the port, and whilst the valve is travelling the difference in the width the steam is locked up in the cylinders, and is urging the piston by virtue of its elasticity. In express-engines the lead is about an eighth of an inch, and the lap is three-fourths or seven-eighths of an inch. The outside edges of the valve in the steam-chest control the ingress of the steam into the cylinder; the inside edges of the valve, which form the boundary line of the cavity within the valve, control the escape of the steam from the cylinder into the exhaust. The steam leaves the cylinder by the port by which it entered, but the valve is so moved by the motion of the excentrics as to release the steam just when it is required into the exhaust chamber of the slide-valve, which is at the same time open to the atmosphere. In timing the movements of the valve, the position of the excentric on the crank-shaft has to be considered." The young man was suffering from locomotive measles, and he could hardly have selected a better man to consult than he did, because he understood the complaint, and treated each patient differently, according to his temperament. Some came with a determination to be cured; others came rather to hear what he had to say, and obtain strength for mind and heart, and then to turn aside to scoff and sneer. But he did not mind that, because he knew that bread cast upon the waters returns after many days. The world may ignore the services of its benefactors, but the time does come when it repents of its ingratitude—too late, very often.

When the engine-man took possession of his engine, he little thought how soon his position of responsibility would cease. His success was all due to one thing—he neglected nothing. And it was this cardinal point which all along had helped him to climb the ladder of promotion, and in many instances to leave many of his mates behind who had started cleaning when he did. One day, a visitor at Michael Angelo's studio remarked to the great artist, who had been describing certain finishing touches to a statue, "But those are only trifles." "It may be so, *in your opinion*," replied the sculptor, "but recollect that trifles make perfection, and perfection is no trifle." In this exalted spirit the fated driver examined his engine for the fatal trip before he joined his train. He inspected it thoroughly and systematically, having been convinced from experience that it was the only way to obtain and maintain his sovereignty over it. It is a very uncomfortable feeling to be working an engine which one fears may give out every minute; and unless it is properly examined, how can a driver know but that, before he has finished his day's work, the glands may come off, or a big-end cotter work out through a set-screw not being properly pinched up. Such things have taken place, and simply await like conditions to occur again.

When the engine is properly examined, the driver derives from the practice a wonderful amount of confidence in his engine. Without this confidence, a driver is perpetually on thorns, and the least thing out of the common leads him to illusions. Habitual examination leads a man home as safe as he was when he left it, unless some one else blunders over whom he has no control. When our departed engine-man left the shed, he never felt more sure of conducting his engine out and home again without an accident. Everything was in the best working order.

With reference to locomotive management in the shed and on the rails, we hear an individual say, "Oh, what's the good of doing that? Oh, he will fill the book with jobs." But such expressions emanate from men who cannot see far into the future. They have insignificant minds. Character is shown by minutiæ. Carlyle has defined genius thus: "It is the capacity to exercise an infinite deal of trouble about nothing."

After all said and done, there is not so much difference between a split-pin being loose in the motion, and leaving the shed without any water in the tender. Many men endeavour to learn how little may be known to keep on the right side. Limited liability is unlimited woe on a railway, and woe betide a man who thinks otherwise. Put conscience into everything, and make every nut, cotter, and split-pin as firm as the foundations of a cathedral. Let the largest and least visible thing about the engine be the same; let your examination be conspicuous for one thing—thoroughness. For years a man may run an engine and never fail, and the secret is not far off to him; but it is a long way off to men who habitually walk through a forest and see no wood.

With the gauge-lamp the engineer examined his own side of his engine, from the trailing-axle of the tender to the leading-axle of the engine, and then underneath, where he scrutinised minutely the crank-axle, with its excentrics and big-ends. Every pin, and cotter, and trimming came under review: with the siphon-taps on the big-ends, which in some engines do occasionally slack back and lose the oil. The corks and buttons were also examined, and were found in good working order, and all the cups filled with oil. This work is done by the fireman, who must have a beginning, and learn to oil before taking charge of an engine. The motion was properly examined, and the glands left fair with their respective rods. The damper was lifted, and a proper examination made of the ash-pan and the lower side of the grate-bars. Coming again outside, the smokebox door was overhauled, and then the fireman's side of the engine, together with the tender-coupling and feed-bags, which concluded a minute but an absolutely essential examination. After oiling the tail trimmings a little, preferring to fill the siphon-cups up when in the siding waiting for the train, he left the shed.

Unnumbered—not counted here—are the brave engine-men and brave firemen who have left their homes never to enter them again—hurled headlong, at a moment's notice, into the presence of God. There are William Wolstonecroft, Thomas Taylor, John Horton, Anthony Sharr, Tom Pepper, John Cartwright, Moses Oldknow, Owen Roberts, express men, as brave and as faithful to duty as ever broke bread; who handled the regulator from shire to city on engines the very pride and *pick of the* road; men that knew no fear, and who never flinched in the fury of speed surrounded by darkness and thunder. They sleep a sleep that knows no waking. Drivers, all of them, thoroughly acquainted with locomotive working and railway traps; men that one would think would be the last to get picked up. Taylor, the woods ringing with the anthem of song from a thousand throats, was turned by the hand of an erring signalman into a river, and he and his fireman were not divided in death. In Wolstonecroft were combined the accomplishments of a thorough engine-man with an honest, open mien—polite, affable, sprightly, capable of speaking to please; a good husband, a loving father. He was in charge of a fast express, and whilst tired nature's sweet restorer was paying a willing visit to many eyes unsullied by tears, he was looking out for signals in a dense fog; but before he saw the signal he struck right into a goods-train, and his fate marked him for a victim for the improvement of railway working. His mangled body and that of his fireman lay by the side of their engine, which was on its side. Golightly persevered for years to surmount all the disadvantages arising from his old parents not having been able to afford him any schooling, and although he was no scholar, he was successful as an engine-man; but the moral of his success lay in his coming on duty plenty of time before train hours. No one could complain of his enginemanship; it was perfection, and it was only in trifles that he excelled. He opened the regulator like other men, and his engine kept time like those of other men; but there was an indescribable charm about the manner in which he did things, such as only can be acquired by engine-men with long practical experience. When Golightly left home, tempests o'er tempests rolled, and the wind blew a terrific gale. He kissed his wife and his four little dears, and walked into the darkness of night. Ah! into the valley of the shadow of death. The northern blast rattled in the chimneys and in the trees, and as they bowed their hoary tops, seemed to relate in murmuring sounds the dark decrees of Golightly's fate. "What of the night, Ambrose?" said the driver to the night-turner—a dear old soul—as he entered the drivers' room to see and hear what was footing afresh. "I think it is a nasty night, Joe; the trains are all late, and there is no hurry for you to go out, for the mail is thirty-five minutes late, and it blows 'big guns' north of the Tweed. What sort of a horse is that of yours in a wind?"—"She is very good," replied Golightly; "but not very grand in a head-wind, and not at all sprightly in a side-wind."—"You must," answered the engine-turner, "look after that mate of yours to-night; he must keep a bright fire, Joe, and keep the smoke out of the chimney. It's the smoke that chokes an engine. Keep the smoke down and the steam up, and she will pull through it. If you get the tubes and chimney full of smoke in a gale, it can't leave the chimney-top unless you work very heavy, and that runs away with the coal, Joe. Keep the smoke down, and I'll be bound she will answer the regulator. She is on No. 6 Road, near the top of New England shed; your fireman is here. Good night, Joe."—"Good night, Ambrose," said Golightly, as he closed the cabin-door, and bid adieu for ever. In half an hour after he was in the siding waiting for the mail, and when it came up the north engine hooked off and he hooked on to it. He asked the north engine-man what kind of a lot they were. "There is some green ones in them," said he; "you will get no coal-money to-night, old fellow." The signal was given "right away," and Golightly dug into it; his engine answered the whip and steamed splendidly; he did not forget the advice of Ambrose, and took particular notice that a little fuel at a time was charged into the fire-box. In fact, he mentioned to his fireman the conversation he had had with the turner. It was a tremendously rough night; and therefore, without such advice, the shovel was working between the fire-box and coal in the tender incessantly. "I think," said he to the fireman, "we are pulling up a little time; but, in a night like this, they must be satisfied if we can keep time." Looking at his watch he found he was just keeping time. "A little bit more fire, mate; I think we can do it if the Northern men can't. What do you say if I sing a song to enliven the heart?" asked the driver. "What would you like? one of the Lancashire poet's?"—"I would, Joe," replied the fireman, "for I want something to make the shovel work, for she's burning a lot of coal."—"One more round, mate," said the driver, "then I will give you Bain's 'Manchester Improving Daily.'" The fire-door was swinging to and fro under the direction of the driver's hand, when the engine gave a lurch. His hand was instantly raised towards the regulator, which he tried to grasp, but he was thrown head first to the fireman's side of the engine, for she was on her way down an embankment. The suddenness of the occurrence deprived both men of any chance of their recovering their hand-hold; they were no sooner pitched into one place than the plunging movements of the de-railed engine sent them flying into another position. Golightly's neck was broken, and the fireman fell into a hedge which broke his fall, and, except a few scratches, was unhurt. The accident was caused by a piece of timber lying in the way of the mail; the timber had fallen off a goods-train. Surely it can be said of our railway engineers, "In the midst of life they are in death."

Driver Williams ran over a bale of wool, which threw his engine off the rails into a field and he was scalded—literally boiled alive. Driver Horton ran into some trucks that had been blown out of a siding, and some of the débris struck him on the head and dashed his brains out. This was a sad case; it occurred on his birthday, and within eight hours of his having given a daughter away in marriage. Driver Shaw was killed in broad daylight, one summer afternoon, within sight of some reapers who were the cause of his death. Poor Shaw, he died amidst the incense of ripe corn and wild flowers by the side of a rippling brook, and in the arms of strangers. The reapers, to get out of the sun, had betaken themselves to the railway arch. The arch contained straw, but that did not prevent them setting down their kettle and pans there. In the one they make tea from the leaves of dandelions, in the other whatever comes first. Not infrequently reapers keep a dog, and the poor doggy works as well as they do, and occasionally finds a rabbit or a hedgehog, and in return they find him in bones and bits of dry bread. But dogs are such faithful and devoted friends to man that they never complain. Through some carelessness the straw under the arch caught fire, and the wood-work of the bridge being dry and full of tar, it soon blazed, to the consternation of the affrighted reapers, who, hearing a train coming, mounted the railway embankment with the object of stopping the train. The driver and fireman saw the reapers making their own kind of signals to stop them, and looking ahead for the object of danger they saw the smoke and flames issuing from the bridge up the sides and in the centre. They knew not how long the bridge had been on fire, in fact they knew not whether there was a bridge left that would support the train. Approaching at a dashing speed when they first saw the reapers, there was not time to pull up. They tried to pull up with the brake-power in their possession, and by reversing the engine, but they found it impossible. So just as they neared the bridge, they saw from the extent of the lapping flames they should be burned, and so they jumped off the engine. The driver had jumped before, about four years back, when he was ruptured; and being a heavy man, as well as being weak inside, when he fell he lay insensible and bled profusely from his mouth and ears. When the reapers ran to him he was dying. The fireman jumped clear of the train and was saved, but such jumps for dear life are more or less attended by injuries, which young hearts with young blood and limbs make light of, though in after years they are forced to doctor themselves for complaints which can be easily traced to the system having been severely shaken.

Driver D. Shaw, fresh and vigorous as the spring, was mowed down by a drunken passenger who pulled the communication cord, when Shaw instantly shut off steam, and went to look out between the engine and tender. His head came in contact with a bridge column, and he was cast to earth—dust to dust.

Driver Legge was blown up with his boiler. His arms and legs were hurled in different directions, and one of the *former* actually went through the window of a private house and fell upon a breakfast-table round which the family were sitting at the time.

Driver Morgan was killed through a telegraph-boy's mistake. A goods-train, through being overlooked, came to a stand in the elbow of a curve in a cutting between two block stations on a single road. The driver was unable to move them with the steam blowing off, so he divided them and ran ahead to the station. It happened that a passenger-train was due at the station in the rear of the goods-train, and when the telegraph boy saw the goods-engine and *some* waggons, he jumped at the conclusion that the whole of the train was there, and accordingly signalled the passenger-train on. The goods-driver stopped at some distance from the station to put off trucks, and as he held the block ticket he thought there was no necessity to tell the station master, and so, when he had put all the waggons away, he returned for the others. Before he reached them he saw a cloud of black dust ascend into the air. That was sufficient. The rest is easily told. The passenger-train which the lad had signalled on ran into the remaining portion of the goods-train, which being in a curve prevented Driver Morgan from seeing it in time to avoid a collision. His went right through the guard's van and into a truck on the other side of it. Hence, the engine fell over into the ballast with the driver underneath, and his fireman; and there died one as faithful to duty as any who have died on a field of battle. Driver Pepper, in charge of a fast express—and who was more fit to have charge?—was steaming north with a magnificent "goer" in a snow-storm. All appeared to be going well, as it had gone with him for years, upon which he had raised a reputation second to none. Suddenly a goods-train appeared ahead, and with a fearful summons he was called upon to act. Extreme danger threatens, the sharp sound of the whistle is heard in the guard's van, and arrests the attention of the neighbouring villagers; the brakes are instantly applied, the engine is reversed, her machinery is set, and her driving-wheels are skidding. It is hopeless; a collision must occur. Both driver and fireman see the danger to which they are exposed, and they are distracted. They agree to jump from their engine. Pepper leaps off and is seen to roll over and over like a ball. He is dead. The fireman follows; he shares no happier fate. He breathes a moment; his back is broken. He is gone. The perils of locomotive driving are such that in some instances no possible amount of foresight can avail.

A driver may have equipped himself with all possible knowledge respecting engines, signals, and the traffic. A man may have bundles and bundles of notes dealing with every question in every condition, and gathered from all quarters of the service, to serve in instances when the judgment is called upon to act instantly without any confusion, vacillation, or distraction, and yet it shall not avail him in the hour of peril. Now our friend the engineer whom we left coming off the shed to join his train was another dead man when he left home,—as pretty a crib as any man could wish for, with as loving a wife as falls to the lot of but few men. He had laid his mother in the grave by the side of his father, and had courted Polly Golightly, whose father was killed on their wedding-day. Polly had been reared almost on the foot-plate; she knew by living in an atmosphere of engine-talk what cranks were, and what would cause a big-end to get hot. Many a time she had pared with her pocket-knife a cork to sample which her father had brought home; she knew the whole construction of a locomotive, for the house was full of engines, either in pictures or in books. It was an easy task for her to make out a report, detailing the particulars of a collision, giving a full account and not saying one word more than was necessary. When making out a report her father would sometimes forget and say, "I think."—"You must not say that, father, you know the foreman requires facts."—"Ah," said he, "Polly, there is nothing like facts, they're not like figures which lie and prove anything which means nothing. Facts, my girl, you're right; there is no getting away from them." Polly's handwriting was well known in the office, where she was held in the highest estimation, for she was a good girl, and when she gave her hand to Fred Knight everybody thought they should lose the pretty reports. But no, she continued to report, and by this means she became acquainted with the whole system of railway working. She had also been accustomed to watch hour after hour for her father, when he was delayed by a breakdown, or by some accidental occurrence, and so she was trained for a driver's companion. Still, she had her fears when Fred was over his time ; she knew his steed was one of the fleetest, and she knew his hand and eye were steady. But whenever he was late, each footfall within hearing she listened to, and when she heard his it was sweetest melody. "He's home again," she would ejaculate to herself, and rush forward to meet him. Ah ! my dear girl, he is gone at last. Fred Knight, after leaving with his train for the south, experienced all the advantages of trained enginemanship, and, in all the ecstasy of motion, the glare of the head-light spread around the head of his engine as usual, and there was nothing to occupy the mind out of the common routine of foot-plate work. The night was dark and frosty, but still it was a pleasant sky, and he was keeping time. He knew all the working of the traffic thoroughly, and expected to see local or through goods in the sidings where they were timed to shunt for the mail, if he did not pass them shunted before they could reach the appointed siding.

One of these local goods-trains arrived at Holly Bush siding to shunt for Fred, who was in charge of the mail, for which all goods are supposed to leave the main-line fifteen minutes before it is due. When the goods arrived opposite the signal cabin, the driver shouted to the signalman, "I am going into the siding for the mail, and when I am clear of the main-line I'll whistle." "All right," replied the signalman; "be as sharp as you can, for she's due in ten minutes." The goods driver took his train up the line to a siding which was not under the control of the signalman, but worked with drop points. The under-guard held the points, and the head-guard called the driver back with a white light, which signifies, "All right." When the driver began to set back, he found the rails were either very slippery or the brakes were on in the guard's-van. He ascertained that the front brake was off, by sending his fireman to look. He reversed his engine ahead, and reversed into them with very little success, and at last he concluded the rear brake must have been left on, and he *whistled* sharply for it to be taken off—a performance well understood between driver and guard. Considerable time had been occupied before he whistled, but when he did whistle, the signalman had the mail on—he had hold of distant-signal lever, dreading to delay or check the mail for a second—and when the goods driver whistled, he took all the signals off, and Fred came up at a dashing speed, and ran right into the goods, which was half in the siding and half out of it. His engine struck a cattle-waggon first, containing twelve cattle-drovers asleep. These were the first to be killed. Fred's engine, striking with the near buffer, took right across the down road over a bit of embankment, and rolled down the slope to the bottom, amidst showers of sparks and belching steam. As soon as possible the driver of the goods ran to the mail engine, but for some time he could not approach the engine for scalding water and issuing steam; and, what was more sad, he could not find either of the men. After waiting for the steam to clear away, he found Fred, or rather his mortal frame. The vital spark was gone. He could have known neither the bliss nor the pain of dying; he knew nothing either of the sting or victory of death; for his death was instantaneous—caused by a blow on the forehead—supposed to have been caused by the regulator handle, and one thigh was broken, which no doubt was done after he was rendered insensible.

The fireman was crushed to death under the engine. The signals were all right for Fred, and he had not the slightest chance of preventing the accident.

But there was one man who could have prevented it, and who should have prevented it, and that was the under guard of the goods-train. The signalman stated in his evidence that if the tail-lights of the goods-train had not been changed until the whole of the train was in the siding, he should not have lowered the signals. As it was, the under-guard changed the *lamps before* he held the points to turn the train into the siding, which was done to save him the trouble of walking the length of the train to change them, after the engine was on the points.

When a goods-train or any other train is on the main-line, it exhibits red lights on its way. Should it go into a siding to shunt for another train, the lamps are turned so as to exhibit white lights; which means to an approaching driver, "It's all right; we're in the siding." To save trouble, and to save his legs, the under-guard changed the lamp from red to white before he was in the siding, and even before he had left the main-line. Such a practice, when followed, should be visited most sharply. Then, again, the signalman was deficient in his practice, because he knew what kind of a whistle indicates "right," and what indicates annoyance. A few sharp whistles means, "Look out, guard; there's something wrong somewhere;" and it remains for the experienced guard to interpret such a sound. But, "all right," when safe or clear of a fouling road, has for years been expressed on the steam-whistle by "crowing." There is no doubt that a considerable degree of security is insured by using a code of whistles. No doubt the whistle will be much improved, so as to emit different tones, each having a definite meaning. For want of a code, with a strict observance of rules, fourteen people lost their lives—driver, fireman, and twelve cattle-dealers—together with twenty head of cattle. None of the passengers were injured, for the engine-tender coupling broke, and none of the carriages left the rails. One of the first-class carriage-doors flew open, and a lady was thrown out, but she was comparatively uninjured. It was decided, after this sacrifice of life, to connect the siding-points with the signalman's box, so that when the points were open to the main-line the signalman could not lower the distant-signal—a system known as interlocking.

It was soon known at head-quarters what had happened, and then commenced one of those most painful tasks of breaking the sad intelligence to the wife, who most likely had to be called up out of a sound sleep to hear of her loss. It was arranged that a neighbour's wife, whose husband had just come home, should call her, and say there was a rumour that Fred had had a collision. But Polly knew too much of railway life not to see there was something behind that. Fred had been in collisions, and she knew that Mrs. Joyce would not come to fill her bosom with fears about that which might simply amount to a few hours' loss of time. With a wild shriek she threw up her arms and exclaimed, "My Fred's dead, Mrs. Joyce! I knew that when I heard the knock at the door. Oh, tell me at once; don't keep me in suspense! Is he suffering, Mrs. Joyce?"—"No, my dear," said she.—"Ah, my Fred, my Fred! thou art gone!" and she swooned away. Intense is grief when it comes suddenly and in the dead of the night; but many a woman wedded to a driver has passed through the ordeal with remarkable firmness and fortitude—because, maybe, they are not strangers to such ordeals. At a locomotive depôt seldom a week passes but some one is either killed or is maimed for the remainder of his life.

Polly's grief was most poignant. She had lost her father, and had now lost her Fred, who had climbed upwards step by step. They had struggled to make a comfortable home, and now, just when they had surmounted all difficulties, her husband was snatched away in the flower of life. The ways of Providence to man are often very mysterious; but railway men need a special Providence. So many wheels revolving, so much independent action and individual supervision, and so wide a scope for the chances of human fallibility! All was not lost to the world when Fred died. His character remained behind to enrich others as certainly as the rich man's wealth remains behind to increase the estate of his heir. How we watch with interest the swelling of a rose-bud in the spring! How we sigh in sadness when its glory is ruthlessly scattered! But still, when that has happened, we gather the shed leaves from the ground and deposit them in a place of safety, and soon we make the glad discovery that in these leaves, even when withered, we retain for enjoyment the fragrance of the rose both in the winter and in summer, when the living flower, fresh and dewy on its leafy stem, can never be restored.

The following lines are very appropriate to his memory:—

"My engine now is cold and still,
No water does my boiler fill;
My coal affords its flames no more,
My days of usefulness are o'er;
My wheels deny their noted speed,
No more my guiding hand they need;
My whistle, too, has lost its tone,
Its shrill and thrilling sounds are gone;
My valves are now thrown open wide,
My flanges will refuse to guide;
My clacks, also, though once so strong,
Refuse to aid the busy throng.
No more, I feel each urging breath;
Life's railways o'er, each station past,
In death I'm stopped, and rest at last.
Farewell, dear friends, and cease to weep;
In Christ I'm safe—in Him I sleep."

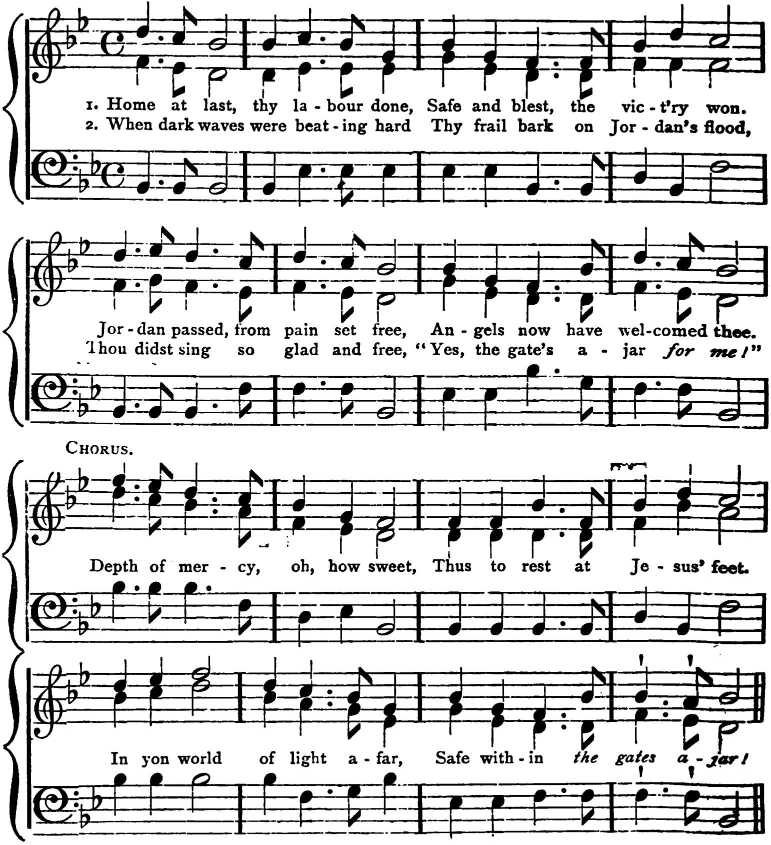
We conclude this chapter with an account of an affecting incident in connection with a railway accident at Manuel.

* * * * *

All was packed and ready for Maggie Lindsay going home to Aberdeen, her school-days being over. At 6.35 on Tuesday morning the train for the north started, and she, with her eyes upon her hymn-book, the leaf turned down at her best-loved song, "The Gates Ajar for Me," tasted once more of the love of Jesus. The awful catastrophe took place, and the collision with the mineral train left her severely injured, and the page of her hymn-book stained with her blood. During the two days of suffering that followed in the house to which she was moved at Manuel, the scene of the railway accident, she often whispered and sang the words of the hymn which was to be her song till death. The minister who watched by her, said the expression of her countenance could not be described as she again and again repeated the words, "Yes, for me, for me!"

FOR ME! FOR ME!

Slow, and with expression. Words and Music by I. D. SANKEY.


1. Home at last, thy la - bour done, Safe and blest, the vic - t'ry won.
2. When dark waves were beat - ing hard Thy frail bark on Jor - dan's flood,
Jor - dan passed, from pain set free, An - gels now have wel-comed thee.
Thou didst sing so glad and free, "Yes, the gate's a - jar *for me!*"
CHORUS.
Depth of mer - cy, oh, how sweet, Thus to rest at Je - sus' feet.
In yon world of light a - far, Safe with - in *the gates a - jar!*

3.

One short day of joy below,
Such as pardoned sinners know;
Then away on wings of love
To thy home prepared above.

4.

When earth's songs have all been sung,
Labour ended, trials done,
"We'll meet again," oh happy word!
And be "for ever with the Lord."

CHAPTER XV.

HOW TO "TREAT" THE ENGINE-DRIVER.

LIFE on the rails is pleasant, travelling along through a network of points, by solitary signalmen, and weary engines; contemplating men and women, towns built upon the hills, castles upon the rocks, a vast gallery of living pictures within range. What a luxury! It is a luxury to the man of pleasure who lives only to kill time. It is a luxury to the man who wants to kill the carking care which threatens to kill him. It is a luxury to the weeping, to the joyous, and to men of business.

Then please do not forget the driver, who carries you away, it may be, from sickness and sorrowful scenes, to scenes of comfort and happiness. A brave man. Don't forget him. He has taken you through the perils of many a journey, and you have to return good for good. He has not, like the old race of stage-coach drivers, time to burn a cigar, or permission to halt for a nourishing fare of roast beef, plum pudding, and old port. But for all that you can "treat" him. The exhilaration of dashing along at one mile a minute for a few hours is a blazing triumph for this country. Everybody thinks that. What a splendid run! How about the driver? Is it a blazing triumph for him to pull you safe home so many, many times, and at last when you are fortunately at home, listening to the rush and roar of the wind outside, he—he, poor fellow, by the error of another—is thrown headlong, with engine and train, into the Tay, or down an embankment.

I have seen how you can "treat" him—seen it for some years, and now I'll tell you.

In the Ashbourne Road, Derby, there is a "home" for the fatherless children of railway servants killed while on duty—and that means that they fell when serving their country—called THE RAILWAY SERVANTS' ORPHANAGE. It means also that their poor widows are cast upon the world, and that, by a cruel fate, their children are of necessity torn from their sides; when all a mother's love, and cost, and care to hold the child avails nothing; for what is stronger than necessity? The "home" at Ashbourne is limited, very limited; and without more assistance many a poor child will begin life but roughly, and the bitter winds of adversity will beat upon the fragile frames until the hectic flush appears on the cheek, poor child! Now, kind reader, I here submit to you the Annual Report for the year 1878. A list of the children in the orphanage is added, with their circumstances when admitted. Instead of there being room for only a few, kindly help to make room for many. That is how I wish you to "treat" the locomotive engine-drivers.

THE RAILWAY SERVANTS' ORPHANAGE.

ANNUAL REPORT.

THE year 1878, the fourth in the existence of the Orphanage, was a year of extreme depression in trade and of wide-spread distress, which made a special claim on the benevolent in almost all parts of the country. This state of things has offered a serious obstacle to obtaining fresh subscriptions, which is attested by numerous letters from zealous supporters. In spite, however, of this unfavourable aspect of commercial affairs, and the fact that the receipts in the first part of 1877 were exceptionally large, the income for 1878 exceeds that of the previous year, and the Committee feel warranted in the conclusion that the object of the institution commends itself more and more to the generous support of the public.

The trade of the country has been declining year by year since the Orphanage was established, and this fact renders it a greater ground of congratulation that funds have been contributed which have sufficed to provide an excellent site, a new building, and the nucleus of a fund which the Committee hope will soon warrant an extension so as to double the existing accommodation.

At the commencement of the year there were 36 children—15 girls and 21 boys—in the home. At the March election three girls and six boys were admitted, and an equal number of each sex in September. In addition, Fitzherbert Wright, Esq., has generously offered to pay £15 a year to support one child, under Rule 36, and a boy from Mexborough, where the railway servants have shown great interest in the cause, enjoys the benefit of this handsome contribution. A boy from Birmingham has been admitted under the same rule, the payment being made from a fund raised when the father was killed; and a girl from Kettering has been received under similar conditions. One girl has been withdrawn on the re-marriage of her mother, and another on compensation having been awarded as the result of an action against the railway company on whose line the father was killed—that not being the company by which he was employed. Three boys left during the year on attaining the age of 14, and 52 children—32 boys and 20 girls—are now in the Orphanage. The fathers of these children were killed on the following lines of railway:—

London and North Western	17
Great Western	12
Midland	9
Lancashire and Yorkshire	6
Manchester, Sheffield, and Lincolnshire	5
Great Northern	1
London, Chatham, and Dover	1
London and South-Western	1

The Committee have decided to admit four girls and six boys very shortly, and as two boys will attain the age at which they must leave in a few weeks, 60 will remain in the home, which is as large a number as the Committee feel justified in receiving into the existing premises. The Committee ask the concurrence of the Governors in deferring the next election until the report for 1878 has been prepared.

To afford the girls more complete instruction and practice in needlework, a sewing assistant has been engaged; and the whole of the clothing, with the exception of the boys' best suits, is now made in the house. A large part of the ordinary domestic work is also done by the children; and as the girls (only two of whom are over twelve) grow older, the Committee hope that this valuable industrial training may be still further extended.

The general health of the children has been good, and in the slight ailments which have occurred, and in two cases requiring special treatment, but in both of which complete recovery has happily followed, the hon. surgeon, Mr. F. W. Wright, has most readily afforded his advice and attendance. The advantage of so healthy a site, and an abundant supply of fresh vegetables, is seen in the healthy and vigorous appearance of the children. Their conduct has been generally good; obedience is maintained without any approach to severity, and the Committee believe that a healthy religious and moral spirit prevails amongst them. The average cost of maintenance, including clothing, rates, and taxes, and all salaries and wages at the Orphanage, is under £20 each child.

During the year the site has been fenced, partly by a wall and partly by oak boarding, at a cost of £332 6s. 9d. Large playgrounds have been provided, and, by the gifts of railway servants at Leeds, swings, both for boys and girls, have been fixed. At Manchester, Mr. Joseph Schofield, a devoted friend of the cause from the first, and others, raised a fund amongst their fellow railway workmen on the railways there, with which they purchased a valuable harmonium, with music-stool, and hymn and tune books. The planting and furnishing have now been substantially completed, and all who visit the Orphanage express their satisfaction with it.

At the March election there were twenty-five, and in September twenty-seven candidates for the nine vacancies to be filled in each case. The Committee regret that so many children, in every way fit objects for the Orphanage, were unable to secure admission, and invite the Governors to consider whether the time has not come to extend the accommodation, so as to enable at least a hundred children to be received.

The state of the funds appear to justify this step. The amount received during the year, including interest, was £3,793, and the total expenditure was £2,711, the result being that the balance of £802 with which the year opened was at the end increased to £1,883. The Committee have again to express their regret that the general expenses have been so heavy. Of the total, three-eighths was incurred by local committees and collectors. These, however, include expenses in getting up entertainments, concerts, &c., and announcing sermons on behalf of the funds. The Committee are gratified to say that one important local committee has reduced its expenditure to less than half the former amount, and trust others will follow this example. The expenses at Derby have been swelled by two elections having been held for the first time in the same year, and as the voters exceed three thousand, the cost is considerable. The report also for 1877 was twice the bulk of that of the previous year. It is impossible to deal with a very large number of small contributors at the same proportionate rate as in the case of an income consisting mainly of large subscriptions, regularly renewed. The Committee will, however, seriously consider how these expenses may be reduced.

The Executive Committee acknowledge with the greatest satisfaction the continued and earnest efforts of Railway Servants in many places on behalf of the Orphanage. If the example of these zealous friends were more generally followed, larger funds would be raised, and the expenses greatly lessened.

The Governors will regret to hear that Mr. W. Green, the zealous friend of the Orphanage at Bletchley, has been suffering from illness during a considerable part of the year; but he has, nevertheless, collected £71 with the most trifling cost. The Long Eaton Committee of Railway Servants have obtained £173, and at Leeds the receipts are almost three times as large as last year. New committees have been formed at Chester, Whitehaven, Northampton, Carlisle, Fulham, Hammersmith, Leicester, &c., *with satisfactory* results. The contributions from Burton have been greatly increased. At Hull the railway employés at the passenger and goods stations of the North-Eastern Railway have taken up the cause with liberality and earnestness, in the former case stimulated by the very liberal example of Mr. Akrigg, the station-master. The efforts of earnest railway men at many places produce important results, and the Committee may mention Mr. Joseph Schofield, at Manchester; Mr. W. Schofield, at Low Moor; Mr. D. W. Scott, at Peterborough; Mr. Cole, at Grantham; Mr. Bartholomew, at Grimsby; Mr. Abbott, at Wigston; Mr. Flintham, at Leeds; and Mr. Forster, at Penistone, as special instances. Mr. George Benfield, of Derby, has in 1878, as in previous years, added considerably to the funds by advocating the claims of the Orphanage from the pulpit. The Wellingborough Committee of Railway Servants also deserve special reference, as they raised £58 during the year at a comparatively small place.

The Committee had hoped to have suggested to the Governors some modification of the existing rules, in order to meet the views of different friends of the Institution, but they prefer to consider the matter more fully before making any specific recommendations. Objection has been taken to the admission of children by election; but the Committee would remind those who share this view that canvassing is forbidden, and they have never heard of any case in which it has been resorted to. Again, whilst a large number of subscribers leave the exercise of their votes to the Committee, the Railway Servants, whose interest in the Institution it is most desirable to retain and increase, attach great importance to the exercise of this power. The Committee will, however, carefully consider this with other suggestions.

In August, a demonstration on behalf of the Institution, mainly organized by the travelling agent, Mr. Vincent, assisted by a Committee of Railway Servants, was held at Derby. In spite of the unfavourable weather a large number of railway men from various parts of the country attended. The friendly societies of Derby heartily joined in the demonstration, and the result was a great gathering in the Arboretum, for the use of which the thanks of the friends of the Orphanage are due to the Committee under whose control it is placed. The pecuniary result was an addition of £60 to the funds; but, beyond that, it served the purpose of drawing public attention to the Institution.

The members of the Executive Committee who retire by rotation are —Mr. Alderman Renals, Mr. A. Woodiwiss (treasurer), Mr. C. Bowring, Mr. E. Cooling, Mr. B. Brindley, and Mr. F. Ward, who consent to be re-nominated. A further vacancy arises from the resignation of a member whose term of office expires next year.

The Committee cannot conclude their report without expressing their thanks to their many sympathisers and supporters, and earnestly appeal for continued and increased assistance, so that they may be able to provide for a larger number of children of respectable Railway Servants, cut off by fatal accidents whilst in the discharge of their duty.

FORM OF BEQUEST.

I give and bequeath unto the Treasurer and Secretary for the time being of the Railway Servants' Orphanage, Derby, the sum of to be applied towards the general purposes of the Institution. And I direct the said last-mentioned Legacy to be paid out of such part of my Personal Estate as may be legally applied in payment of Charitable Legacies.

If a testator wishes the charity to receive the legacy free from duty, he will please to add :—

And I direct the said last-mentioned Legacy to be paid free from Legacy Duty, which I direct to be paid out of the same Fund.

LIST OF CHILDREN.

GIRLS.

1. COPESTAKE, ALICE, Derby. Born April 8th, 1866. Father a Number-taker on the Midland Railway. Knocked down and run over November 5th, 1873. The widow, who keeps her father's house, was left with five children under ten years of age. Admitted 13th January, 1875, by presentation.
2. LONG, THIRZA ELLEN. Born 5th January, 1868. Father a Goods Guard on Great Western Railway. Killed at Paddington, February 28th, 1875, leaving a widow with eight children. Admitted by presentation, July 31st, 1875.
3. AYRES, ELLEN SARAH. Born June 16th, 1868. Father a Goods Guard on Great Western Railway for 30 years. Was run over at Gloucester Yard, October 24th, 1874, leaving a widow with six children. Admitted October 10th, 1875, by election.
4. BIDDLE, ALICE, Birmingham. Born March 14th, 1867. Father an Engine-driver on Great Western Railway. Run over and killed, September 10th, 1875, leaving a widow with seven children under thirteen. Admitted by payment from a subscription by Mr. Joseph Bordis, November 26th, 1875.
5. LEADBEATER, SARAH ANN, Emscote, near Warwick. Born February 19th, 1867. Father a Guard on the London and North Western Railway. Killed at Leamington Station, February 19th,

1876, leaving a family of eleven, seven of whom (one an imbecile) are entirely dependent on the widow. Elected March, 1876.

6. JONES, SARAH ANN, Wandsworth Road, S.W. Born February 18, 1868. Father was a Goods Guard on the London, Chatham, and Dover Railway. Killed by being run over by engine, December 8th, 1875, leaving four children under ten years of age dependent on the widow. Elected March, 1876.
7. MEACHAM, EMILY, Castletown, Stafford. Born October 9th, 1866. Father was a Goods Guard on the London and North Western Railway. Killed at Cannock, 7th March, 1876, leaving seven children. Admitted by payment, August, 1876.
8. JENKINS, SARAH ANN, Market Hill, Buckingham. Born June 4th, 1867. Father was a Porter on the London and North Western Railway, at Oxford. Killed by a fall from the Guard's van, July 13th, 1875, leaving two children dependent on the widow. Elected October, 1876.
9. LOWE, ALICE ANN, Bolton. Born May 8th, 1868. Father a Goods Guard on the Lancashire and Yorkshire Railway. Killed while shunting at Moss Gate Station, 31st December, 1875, leaving three children. Elected October, 1876.
10. MEACHAM, LIZZIE MARIA. Born 6th January, 1868. Sister to No. 7. Admitted by election, 4th October, 1876.
11. COLEMAN, MATILDA, Worcester. Born September, 1869. Father a Goods Guard, killed on the 23rd May, 1876, leaving two children, aged 8 and 5 years, dependent on the grandmother, Maria Jakeman, the mother of the children being dead. Admitted October, 1877.
12. ROWKINS, ADA MARY, Stoke Prior, Bromsgrove. Born March 2nd, 1870. The father, Alfred Rowkins, a Pointsman on the Midland Railway, was run over on the line and killed April 30th, 1877, leaving six children. Elected October, 1877.
13. WOODWARD, JEMIMA, of Watford, Herts. Born 23rd January, 1869. The father, a Hammerman, lost his life by an accident at the Camden Smith's shop, London and North Western Railway, March 2nd, 1877, leaving seven children dependent on the widow. Admitted October, 1877.
14. CORNER, ELIZA MARTHA, Brentford, Middlesex. Born 15th April, 1869. Father, Engine-driver, killed on Great Western Railway, at Mountain Ash, 8th May, 1877. Elected April, 1878.
15. PRICE, LOUISA, Birmingham. Born 7th November, 1868. Father a Goods Guard, killed whilst shunting on Great Western Railway, at Slough, 2nd October, 1877, leaving five children. Elected April, 1878.
16. SHELVEY, WILHELMINA MATILDA, Bletchley. Born 20th November, 1870. Father an Engine-driver, London and North-

Western Railway. Killed in the Harrow accident, 26th November, 1870, leaving four children. Mother since dead. Admitted May, 1878.

17. ROWKINS, EMMA ELIZABETH. Born 28th May, 1872. Sister to No. 12. Admitted October, 1878.

18. SPROAT, MARY JANE, Preston. Born 18th March, 1871. Father a Goods Guard. Killed by being knocked down by Engine on London and North Western Railway, 7th January, 1877, leaving five children. Mother dead. Admitted October, 1878.

19. ODDY, LILY ANN, Halifax. Born 3rd June, 1870. Father foreman-shunter on Lancashire and Yorkshire Railway. Knocked down whilst shunting and killed, 10th December, 1873, leaving five children. Admitted October, 1878.

20. JOHNSON, EMILY, Kettering. Born 27th June, 1870. Father a Ballast Guard on Midland Railway. Knocked down by Engine, 17th November, 1877, leaving three children. Admitted 7th December, 1878, under Rule 36.

BOYS.

1. WINFIELD, RICHARD, Manchester. Born 29th March, 1867. Father a Yardsman, Great Western Railway, Liverpool Road Station, Manchester. Died from inflammation from injury received while on duty, May 24th, 1872, leaving six children dependent on a maiden aunt, who keeps a small sweetmeat shop. Mother died previously. Admitted 11th January, 1875.

2. NEAL, WILLIAM GRAYSTON, West Gorton, Lancashire. Born November 18th, 1867. Father a Goods Guard on the Lancashire and Yorkshire Railway. Killed November 21st, 1874, leaving two young children. Admitted January 11th, 1875.

3. CHEETHAM, JAMES, Ardwick, Manchester. Born July 7th, 1867. Father a Guard on the Manchester, Sheffield, and Lincolnshire Railway. Crushed between buffers, February 7th, 1873, leaving five children. Admitted January 11th, 1875.

4. SKINNER, HARRY, Barton-on-Humber. Born March 3rd, 1865. Father a Guard on the Manchester, Sheffield, and Lincolnshire Railway. Decapitated by train at Broughton Lane Station, November 26th, 1873, leaving six children. Admitted January 16th, 1875.

5. LONG, WILLIAM ARTHUR, Worcester. Born 29th October, 1865. Brother of Thirza Long, No. 2. Admitted 31st July, 1875.

6. COPESTAKE, EDWARD, Derby. Born 12th October, 1868. Brother of No. 1 girl. Admitted 4th October, 1875.

7. SKINNER, HERBERT. Born 14th November, 1868. Brother of *No. 4.* Admitted 7th October, 1875.

8. PENN, ~~GEORGE, Oxford. Born January 16th, 1867~~. Father a Goods Guard on the Great Western Railway. Run over in the Worcester Yard, February 27th, 1875, leaving this child. Admitted October 22nd, 1875.
9. BIDDLE, WILLIAM HENRY, Birmingham. Born 8th April, 1865. Brother of Alice Biddle, No. 4. Admitted 8th November, 1875.
10. LEADBEATER, FRANCIS, Walsall. Born 2nd January, 1869. Brother to Sarah Ann Leadbeater, No. 5. Admitted 8th April, 1876.
11. FORD, JAMES, Longsight, Manchester. Born April 5th, 1869. Father was an Engine-driver on the London and North Western Railway. Killed on the Line, May 28th, 1875, leaving five children. Elected March, 1876.
12. SANDFORD, WILLIAM, Chorley, Hollingwood, Manchester. Born May 14th, 1867. Father was a Pointsman on the Lancashire and Yorkshire Railway. Run over November 27th, 1875, leaving seven children. Elected March, 1876.
13. HOLT, ROBERT, Warrington. Born November 1st, 1867. Father a Brakesman. Killed on the London and North Western Railway, November 17th, 1875, leaving four children. Elected September, 1876.
14. LANE, ARTHUR, Ardwick, Manchester. Born December 27th, 1867. Father a Goods Guard on the Midland Railway. Killed while shunting at Miller's Dale Station, 26th June, 1876, leaving two children. Elected September, 1876.
15. PORTER, WILLIAM JAMES, Derby. Born September 21st, 1868. Father a Joiner in the Signal Department of the London and North Western Railway. Killed on the line, 9th December, 1875, leaving four children. Elected September, 1876.
16. WILLIS, FREDERICK, Openshaw, Manchester. Born October 17th, 1867. Father an Engine-driver on the Manchester, Sheffield, and Lincolnshire Railway. Killed on the line March 18th, 1876, leaving four children. Elected October, 1877.
17. WILLS, GEORGE WILLIAM, of Sudbury, Middlesex. Born September 3rd, 1868. Father a Porter on the London and North Western Railway, at Watford. Killed whilst shunting, July 3rd, 1876, leaving three children. Elected October, 1877.
18. CAVE, HARRY ALLBRIGHT, Blisworth. Born 13th March, 1868. Father a Shunter on the London and North Western Railway, at Blisworth. Killed by being run over by an engine, May 6th, 1876, leaving four children. Elected October, 1877.
19. EATON, GEORGE, Derby. Born 15th June, 1870. Father, Platelayer, Midland Railway. Run over in a fog, 25th January, 1873, leaving seven children. Admitted 3rd May, 1878.

20. SIBLEY, HENRY CHARLES, Gloucester. Born 12th June, 1869. Father, Engine-driver, Midland Railway. Accident led to paralysis and insanity, of which he died, 7th January, 1878, leaving seven children. Admitted 3rd May, 1878.

21. SPROAT, WALTER, Preston. Born 13th September, 1868. Brother of Mary Jane Sproat, No. 18. Admitted 7th May, 1878.

22. CAVE, ARTHUR, Blisworth. Born 8th March, 1870. Brother of Harry A. Cave, No. 18. Admitted 9th May, 1878.

23. ASTINGTON, JOHN, Manchester. Born 17th December, 1869. Father, Engine-driver, London and North Western Railway. Run over, 7th September, 1877, leaving five children. Admitted 10th May, 1878.

24. PRICE, CHARLES, Birmingham. Born 15th April, 1870. Brother of Louisa Price, No. 15. Admitted by payment from a fund collected after father's death, 11th May, 1878.

25. SANDFORD, THOMAS, Manchester. Born 20th December, 1870. Brother of William Sandford, No. 12. Admitted 11th May, 1878.

26. HOBSON, WALLACE, Mexborough. Born 10th June, 1869. Father, Goods Guard, Manchester, Sheffield, and Lincolnshire Railway. Crushed between buffers at Wath, 9th August, 1873. Admitted by annual payment, by Fitzherbert Wright, Esq., 10th August, 1878.

27. CLIMER, ROBERT, Willesden. Born 8th February, 1871. Father a Signalman, London and North Western Railway. Killed 11th November, 1876, leaving two children. Elected October, 1878.

28. JENKINS, HENRY RICHARD, Hitchin. Born 1st May, 1868. Father, Engine-driver, Great Northern Railway. Killed 16th February, 1878, leaving nine children. Admitted 19th October, 1878.

29. PENNY, WILLIAM, London. Born 29th September, 1869. Father, Foreman Porter, London and South Western Railway. Killed by engine, 8th December, 1877, leaving seven children. Admitted 24th October, 1878.

30. ALLEN, HENRY, Sheffield. Born 2nd January, 1869. Father a Drayman, Midland Railway. Run over by loaded dray, 11th May, 1878, leaving nine children. Admitted 22nd October, 1878.

31. WILLIAMSON, JOHN HENRY, Manchester. Born 4th May, 1870. Father, Engine-driver, Lancashire and Yorkshire Railway. Killed at Rochdale, 10th May, 1878, leaving eight children. Admitted 28th October, 1878.

32. SPACKMAN, JOHN WILLIAM HENRY, Hereford. Born 12th November, 1868. Father, Engineman, Great Western Railway. Crushed by gearing of engine, 14th July, 1877, leaving four children. Admitted 28th October, 1878.

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From the Doncaster, Nottingham, and Lincoln Gazette, *July 12th*, 1878.

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From the English Mechanic, *November 16th*, 1877.

As novel as it is useful.

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Charles Dickens has drawn attention to some few of the many virtues of engine-drivers in his inimitable sketch of Mr. Toodles, the father of the dissolute Rob the Grinder. Dickens, however, had not sufficient acquaintance with the practical working of a railway, and with the dangers and difficulties to which an engine-driver is almost hourly exposed, to do more than suggest the good qualities that in Mr. Toodles shine conspicuously through his oily and dusty apparel, and betray themselves under a huskiness of voice which he attributes to constant irritation from the ashes. A little volume by Mr. Michael Reynolds will give the general reader—if he will take the trouble to grapple with the technical details of a practical manual for the use of working locomotive-drivers—some slight notion of what their dangers and difficulties really are.

From the World, *November 14th*, 1877.

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ON "THE MODEL ENGINEER, FIREMAN, AND ENGINE-BOY."

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From THE DAILY NEWS, *September* 22*nd*, 1879.

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From IRON, *September* 13*th*, 1879.

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From THE BUILDER, *October 4th*, 1879.

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From THE BUILDING NEWS, *October 17th*, 1879.

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From THE IRON AND COAL TRADES REVIEW, *September 5th*, 1879.

MR. REYNOLDS is one who, from long practice, has qualified himself to speak with authority upon this subject; but he is more than this—he has a facile pen, and can invest with something like attraction particulars which, in the main, ordinarily are dry reading to the generality of the public. . . . It would pay the railway companies to distribute copies of the book to all the officials connected with their locomotives. It would assist them in becoming something more than machines, as some of them are; it would rouse them to find out "the why and the wherefore" of their instructions for managing an engine, and by a more intelligent appreciation of their duties they would be able to carry out their work more economically. . . . The progress of an official attached to an engine is sketched out from the engine-boy to the driver, and valuable hints are given applicable to each stage of his career. Information that it is essential for him to know is placed before him, and indeed we may say that this book is a text-book to the duties peculiar to a locomotive.

From THE COLLIERY GUARDIAN, *August 16th*, 1879.

THE volume is a very smart and attractive production, and gives external promise of intellectual life within, which is not disappointed. . . . . Should be read with care by men who aspire to the positions of locomotive superintendent, foreman, or any of the offices preliminary thereto. . . . Invaluable to those for whom it is specially intended as well as highly interesting to the general reader.

From THE RAILWAY NEWS, *August 30th*, 1879.

WE have on several occasions drawn attention to the kindly and intelligent efforts which Mr. Reynolds has made to improve the intellectual and mechanical training of engine-drivers, by placing before them in suitable language suitable outlines of the philosophy and growth of the steam-engine and its mechanism, and good practical rules for the guidance of his readers in the discharge of their duties, rules which, if properly laid to heart, could not fail to be of great benefit both to those for whom they were meant and the public at large. . . . The principal feature of this, as of all Mr. Reynolds's works, is the essentially practical nature of his proposals and suggestions, and we heartily recommend all Mr. Reynolds's writings to those for whom he writes, and also to railway officials and directors as containing many hints and plans, which, if adopted, would result in the material advantage of their employés.

From THE RAILWAY SERVICE GAZETTE, *August 29th*, 1879.

THE book is replete with information and graphic detail for the railway man who seeks practical knowledge combined with interesting matter. . . . No one can read this book without being led to the conclusion that the author is an engineer of very considerable ability.

From THE MINING JOURNAL, *August 23rd*, 1879.

THE volume is of a thoroughly practical and useful character, and should be placed by every railway company within the reach of the members of their running service, as the more its contents are known in the engine-sheds, the greater will be the advantage to the companies.

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THIS work is the result of the experienced labour of one who has spontaneously been denominated by the class "The Engine-driver's Friend." . . . We commend it strongly to locomotive superintendents and railway authorities generally throughout the kingdom. It is a book which they might well distribute, broadcoast and gratuitously, among the several grades of employés named in its title, for the lessons inculcated in it, and the wholsome advice given, would insure an adequate return—in the shape of increased efficiency for their duties—from the latter.

From THE FOREMAN ENGINEER, *September*, 1879.

As was stated in the last issue of this journal, the work is of far too much importance—both to the railway world and to the public at large—to be dismissed with a summary notice. It really embodies, in terse, clear, and frequently epigrammatic language, the results of the experience and observation of a man whose whole life has been spent among locomotives, and who, by dint of his own skill, industry, and perseverance, "rose from the ranks" to a highly responsible official position on the London, Brighton, and South Coast Railway. . . . The utterances, counsels, and suggestions to be found in the pages of the "Model Locomotive Engineer" are entitled to the highest respect, and deserve the most careful consideration. The book, although treating of practical subjects in a practical manner, is written in so popular a style as to make it attractive—and instructive also—alike to readers within and without the pale of the engineering trades.

From THE MACHINERY MARKET, *September 1st*, 1879.

As a locomotive superintendent Mr. Reynolds can speak with authority on railway service, and judging by the zeal which the author shows to enlighten the men, there is plenty of scope for his object. . . . It will doubtless be widely read by the class for whom it is written, and we have pleasure in recommending it to the notice of engineers generally, and any one interested in railway matters.

From The Literary World, *September 19th*, 1879.

The enthusiasm of our author is based upon the complete practical knowledge of his subject. His soul glows within him at the sight of a steam-engine, because it is a symbol of all those energies which have been spent in bringing it to its present state of perfection. And his aim in the present volume is to kindle the same enthusiasm in all who have to do with it. . . . If this spirited book were placed in the hands of every official in connection with the railways of the kingdom, it would be beneficial both to them and the public.

From The Weekly Dispatch, *September 28th*, 1879.

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From The Journal of Society of Arts, *September 19th*, 1879.

Mr. Reynolds is evidently in earnest in his efforts to raise the status of the class for which he writes, and of which he speaks with the knowledge coming from practical experience, he having been himself, as his title-page informs us, a locomotive inspector of the Brighton Railway.

From The Bookseller, *September*, 1879.

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From The Weekly Times, *August 31st*, 1879.

Mr. Reynolds has had practical experience, and therefore speaks with authority, and his words should be carefully perused by the engineers, the firemen, and the engine-boys who have anything to do with engines. . . . . How thoroughly the writer has learned his duties is evidenced by that portion of the book which deals with "certificates of qualifications in the running service, locomotive department," and this portion of the book ought to be put into the hands of every one who aspires to be an engine-driver. . . . . We heartily commend his book and his suggestions to the consideration of railway men everywhere.

From The Manchester Examiner, *October 1st*, 1879.

A book which may be given without hesitation to a boy with a taste for mechanical pursuits.

From The Glasgow Herald, *November 7th*, 1879.

This volume is doubtless of special value to the hard-working artisans who work our railways; but it may be read with interest by all.

From THE LIVERPOOL ALBION, *October* 11*th*, 1879.

IT will be read with eagerness by many a sharp lad whose lot is to carry a "torch lamp" and a "steel broom;" and it will find favour with others who, like ourselves, have no professional acquaintance with its subject.

From THE SCOTSMAN, *August* 29*th*, 1879.

THE value of Mr. Reynolds's method must be decided by railway administrators, and cannot be estimated by outsiders; but it is evident from the style and structure of this volume that its author knows thoroughly the subject he discusses. The book has wider claims on attention than its specific object. . . . . Mr. Reynolds has put down in black-and-white much well-assorted information and suggestion, which the consideration of railway directors and pressure of public opinion might elaborate into very desirable improvements on our railway system.

From THE DUNDEE ADVERTISER.

A BOOK for all railway men. The history of the steam-engine, the life of Stephenson, and everything connected with the great railway engineers of the past fifty years, give to this handsome volume a special value to all interested in railway work.

From THE DONCASTER FREE PRESS, *September* 20*th*, 1879.

THIS excellent work must have a great sale amongst the thousands who are all more or less connected with the "iron horse." The book treats most carefully and exhaustively on every item with which the engine-driver, fireman, and engine-boy are daily in connection. The author evidently understands the subject which he describes, and from the first insignificant little locomotive that was ever expected to move by the unseen agency, to the present day of ponderous giants, the author most carefully describes the ingenious and scientific progress of the locomotive steam-engine. The engineers, who have (we presume) learnt their trade, engine-drivers, who from long experience one would suppose were perfect in their craft, and firemen, who aspire to a higher branch, nothing better than this new work can possibly be of service, for no matter how clever a man may be or suppose he is, there is still something to be learnt.

From THE PUBLISHERS' CIRCULAR, *October* 2*nd*, 1879.

WHILE his book has a direct aim in the interests of the public at large, its author, who is by profession a railway engineer, has the welfare of the great body of men employed in our railway system at heart, and to them his work may be specially commended, not only as a guide to the due discharge of their duties, but as a manual which will give them high views of the true dignity of honest and intelligent labour.

From THE BRITISH MERCANTILE GAZETTE, *August* 29*th*, 1879.

THE author of the volume before us, Mr. Michael Reynolds, has well earned his title of "The Engine-driver's Friend," and possesses a double claim upon the attention of the reading public when he discourses of a subject with which he is so well acquainted as the general condition of the locomotive engineer, fireman, and boy. . . . . Written in a thoroughly readable style, the technical matter being relieved by a liberal sprinkling of personal anecdotes, &c., the work is one which should not only become extremely popular amongst the class to whom it more directly appeals, but is full of interest for the general public.

From THE DONCASTER AND NOTTINGHAM GAZETTE, *August 15th*, 1879.

THERE is no doubt that the work will be extremely valuable to all engaged in this department of railway labour, and should the author's suggestions be followed, one may look forward to a time when we may have not only the best railways and the fastest locomotives, but the best engineers, firemen, and engine-boys in the world.

From THE NORTH BRITISH DAILY MAIL, *November 7th*, 1879.

THE book should be read by all locomotive-engine drivers.

From THE KENTISH EXPRESS, *October 18th*, 1879.

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From THE SOUTHERN WEEKLY NEWS, *October 11th*, 1879.

AT the present time a history of the founders of our railway system, and an essay on the duties of engine-drivers and stokers, together with a description of continuous brakes, will not fail to be appreciated by men of a mechanical bias, although the book is professedly written for the instruction and guidance of railway mechanics. . . . The book is an important addition to the literature of the railway, and is founded on practical experience.

From THE NEW SWINDON EXPRESS, *September 20th*, 1879.

THIS highly interesting and practical work, while entertaining to general readers, aims at instructing those for whom it was more particularly written. . . . . We warmly recommend the work to our numerous readers interested in locomotives.

From THE CREWE AND NANTWICH CHRONICLE, *October 4th*, 1879.

IN its pages is a complete system for locomotive superintendents to work to, and a comprehensive system for the engineers of locomotive engines. The book is certainly one which should be in the hands of every person having to do with locomotives, either in their construction or use.

OPINIONS OF THE PRESS
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From The English Mechanic, *November 12th*, 1880.

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From The Railway News, *November 6th*, 1880.

We heartily recommend it to the class for whom it is written, and would suggest to those who use stationary engines that they obtain a copy of this volume—which is well printed and illustrated—for their enginemen, who, if they profit by its lessons, will be better qualified for their work, and the better and more manly citizens.

From The Mining Journal, *November 13th*, 1880.

To the young working engineer Mr. Reynolds's volume will prove of especial value, since it will afford him such an acquaintance with all the parts of an engine and their uses, that his practical work in the shop will be much facilitated. . . . The information is collected with much care, and may be accepted as thoroughly reliable.

From The Universal Engineer, *November 12th*, 1880.

The writer has done his work thoroughly and well. . . . We should be glad to know the work was in the hands of every engine-driver in the country; and as a means of obtaining this end, we recommend the purchase of it by all those who number a stationary engine among their belongings. The trifling outlay will be well repaid in the additional security which a perusal of the work cannot fail to give.

From The Timber Trades Journal, *November 20th*, 1880.

Written in a clear and comprehensive way, the author has explained very lucidly the different parts of the various engines that are now in common use throughout the world, so that those even who have only the vaguest knowledge of mechanics can readily become intimate with them from a careful study of the book before us. . . . We can recommend those to whom the work is specially dedicated to learn its precepts by heart as soon as possible.

From The Wolverhampton Chronicle, *November 17th*, 1880.

We recommend the work to the notice of practical enginemen and firemen desirous of knowing all the minutiæ of their occupation.

From The Newcastle Courant, *November 19th*, 1880.

This is a book which should be in the hands of every engine-driver. . . . The information conveyed is of a most instructive character. The work is admirably illustrated with plates and woodcuts.

From The Weekly Dispatch, *November 21st*, 1880.

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